

INFORMAL REPORT

OCEANOGRAPHIC DATA REPORT
SAN CLEMENTE ISLAND AREA
JULY AND AUGUST 1967

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INFORMAL REPORT

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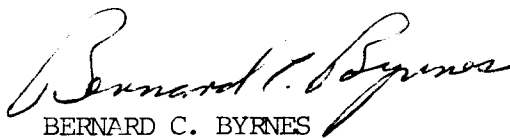
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ABSTRACT

This report presents oceanographic data collected during July and August 1967 aboard the USNS DAVIS (T-AGOR 5) in the San Clemente Island Deep Submergence Rescue Vehicles Test Range and SEA LAB III areas. The Deep-Towed Profiler records show two small valleys in the SEA LAB III area. The bottom's surface was predominately sand at the sites sampled. Nansen cast data show that the water column temperature decreases almost linearly below the thermocline. Although current speeds of 0.5 knots were recorded at the 100 and 260 fathom sites, the predominant current speeds varied from 0.0 to 0.2 knots. The near-bottom current at the 42 fathom site reached 0.7 knots with a mean speed of 0.5 knots. The current direction at the sites sampled reverses along an axis parallel to San Clemente Island. Bottom photographs show that the bottom is alternately smooth and flat, steep, and boulder strewn.

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This Manuscript has been reviewed and is approved for release as an UNCLASSIFIED Informal Report.



BERNARD C. BYRNES
Director
Developmental Surveys Division

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INTRODUCTION

General

During July and August 1967, the Bottom Environmental Survey Project (BESP) of the Naval Oceanographic Office (NAVOCEANO) conducted an oceanographic environmental survey in the vicinity of San Clemente Island (SCI), California. This information is intended to supplement the data obtained during the October to December 1966 survey in the same area (1). The purpose of these studies was to obtain oceanographic information for the support of the Deep Submergence Systems Project (DSSP).

Mr. A. R. Mooney was the NAVOCEANO Project Leader, and was assisted by Messrs. R. Thomas, J. Coleman, L. Freeman, W. Graves, and S. Dory during the July survey and by Messrs. R. Oser, R. Thomas, M. Fagot and L. Freeman during the August survey.

Operations

The survey was conducted aboard USNS CHARLES H. DAVIS (T-AGOR 5) from 5-8 July and 19-23 August. In addition, a Navy Torpedo Recovery Boat (TRB-7) from the Long Beach Naval Station and a Patrol boat from the Naval Undersea Warfare Center Facility, San Clemente Island were used on 18 August to recover current meter arrays. Observations were made in the Deep Submergence Rescue Vehicle (DSRV) Test Range and in the SEA LAB III area adjacent the northeast side of San Clemente Island (Figure 1). The observations made were as follows:

- 4 Bottom samples
- 5 Nansen casts
- 26 Miles (approximately) of Deep Towed Profiler (DTP) track
- 80 Miles (approximately) of bathymetry track
- 1 Bottom Environmental Sensing System (BESS) launch and retrieve
- 3 Current meter array plants
- 5 Miles (approximately) of towed camera bottom photographs

Data

Original records of all data are retained by NAVOCEANO.

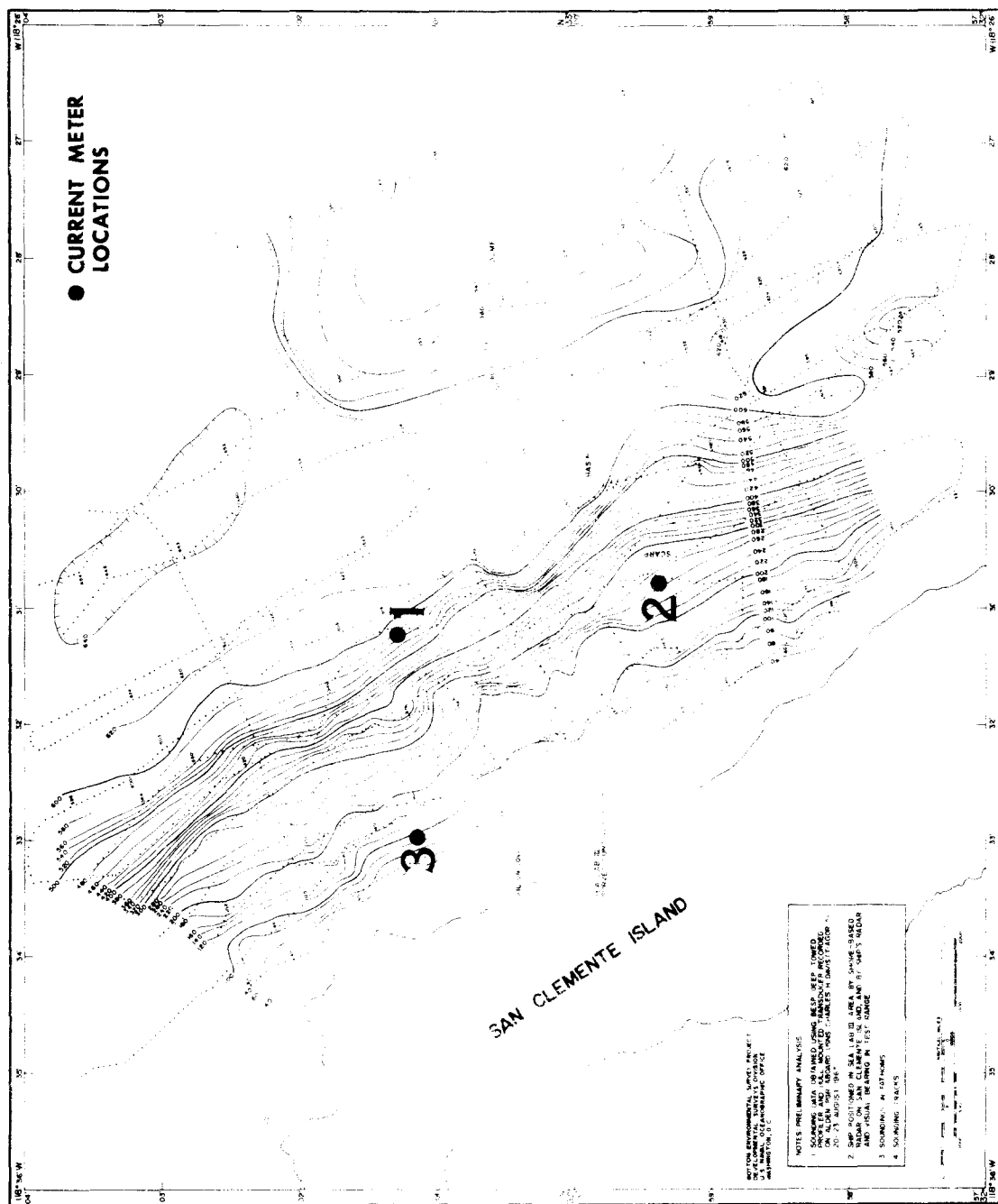


FIGURE 1 TEST RANGE BATHYMETRY AND CURRENT METER ARRAY SITES

II. BATHYMETRY

General

A deep-towed, high-resolution profiler was used in the SEA LAB III and DSRV Test Range areas during the survey. The objective of this system was to tow the sonic source near the bottom in order to reduce the ground coverage thereby increasing the bathymetric detail of the records. Secondly, high resolution, shallow subbottom profiling could be achieved since the water column attenuation was reduced (2).

Methods and Procedures

Two 12KC EDO Model 465 transducers were mounted back to back in an Ocean Research Equipment's Towed Transducer Vehicle. These transducers were synchronized and keyed by the shipboard Alden 419 Precision Graphic Recorder (PGR) through a 2H1 low center resistance (4.38 ohms/1000') conductor cable. Every 1/4 second the transducers were keyed to emit a 12KC signal upward toward the air-sea interface and downward toward the sea-bottom interface. The reflected returns were received at the transducers, amplified, and transmitted to the ship through the conductor tow cable. These signals were displayed on the recorder as fish to surface and fish to bottom distances. In the SEA LAB III area, the fish distance behind the ship was determined using the ship's hull transducers as passive hydrophones to determine the slant range from fish to ship (Figure 2). The horizontal distance was computed from this information. During the SEA LAB III survey, the ship was navigated by Randall Radar on San Clemente Island. In the DSRV Test Range bathymetric survey, the deep towed profiler was towed in the shallow portion and the standard 12KC hull-mounted transducer was used in the remainder of the Range. During this time the ship was navigated by visual bearings but periods of fog rendered some of the fixes questionable.

Analysis and Results

A bottom contour chart of the DSRV Test Range is presented in Figure 1. The steep San Clemente Escarpment, a section of the Santa Catalina Basin, and a flank of the dome are shown. Figure 3 is a contour chart of the SEA LAB III area showing sounding and cross-section lines. The cross-sections are presented in Figure 4. Section A-B shows the rapid slope increase at the 55 fathom line. PGR presentations of SEA LAB grid lines #2, #4, #6, and #10 are shown in Figures 5 to 8. Line #4 shows one of the valleys and lines #6 and #10 show both the valleys present in the area.

U.S. NAVAL OCEANOGRAPHIC OFFICE
**BOTTOM ENVIRONMENTAL
 SURVEY PROJECT**

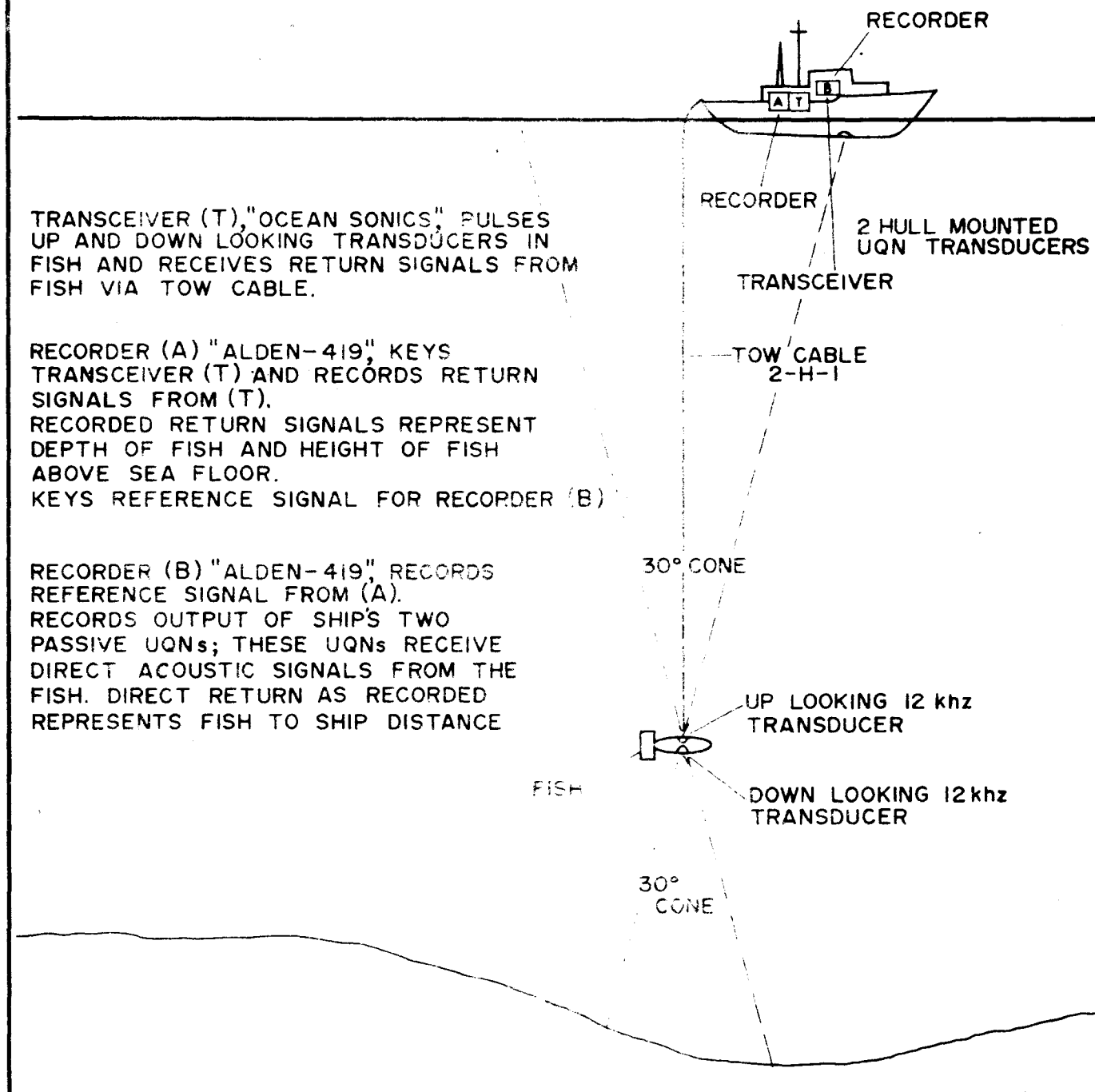


FIGURE 2 DEEP-TOWED PROFILER SYSTEM

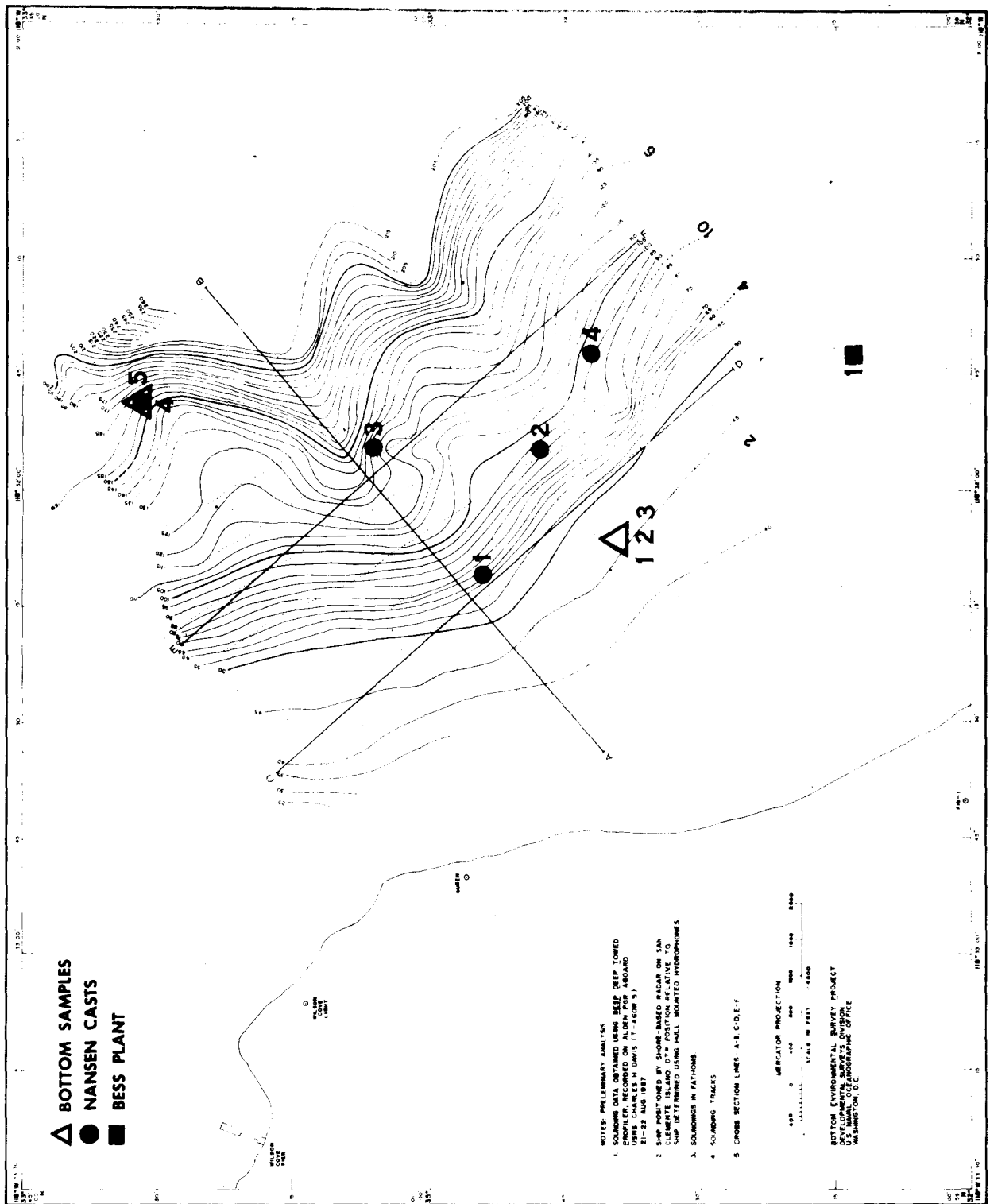


FIGURE 3 SEA LAB III SITE BOTTOM TOPOGRAPHY

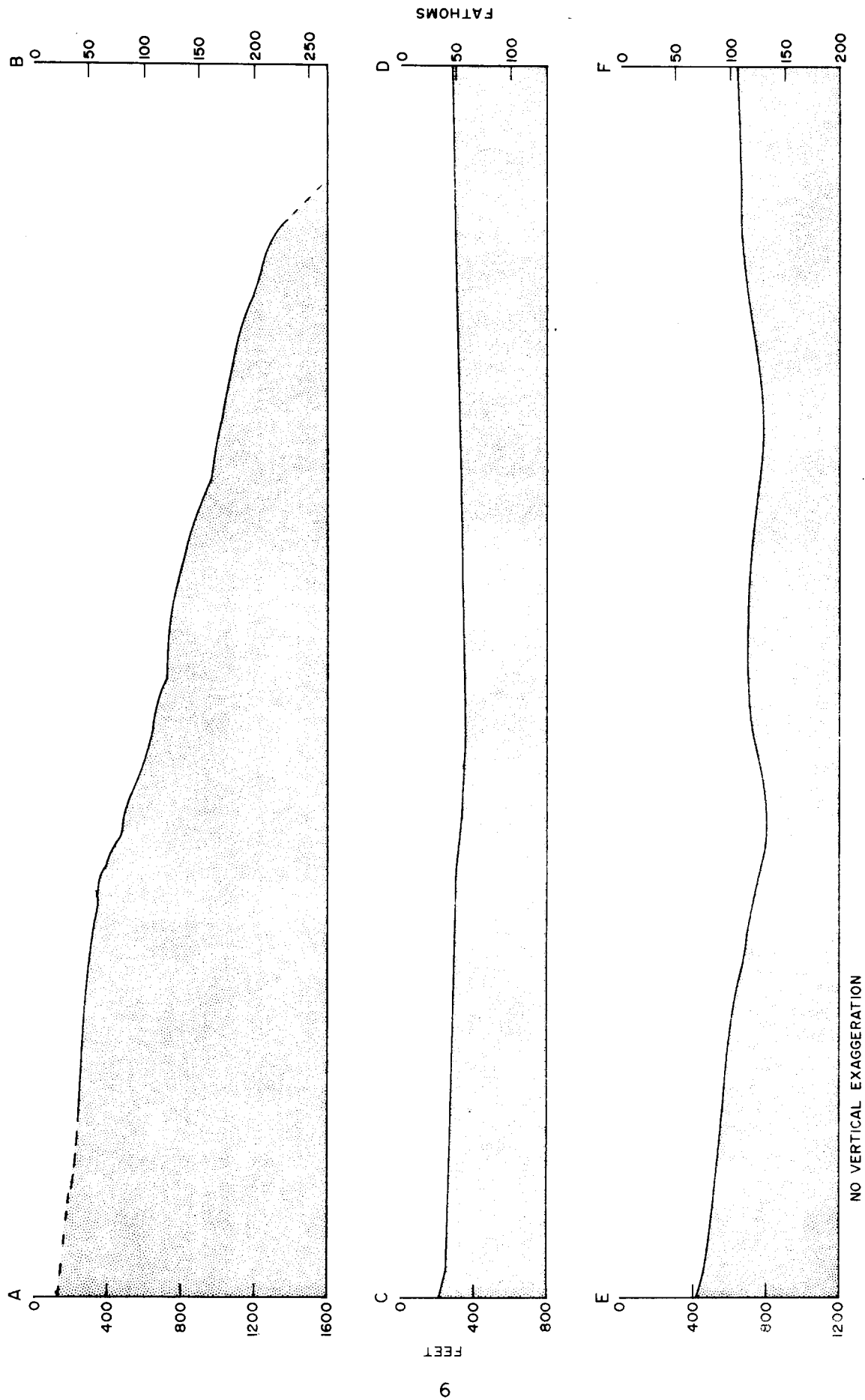


FIGURE 4 SEA LAB III AREA CROSS-SECTIONS

Scale: 0

F/BM=16
F/SU=29

F/BM=14
F/SU=29

F/BM=1
F/SU=29

P/PSH

F/BM=1
F/SU=29

F/BM=14
F/SU=29

T.B.P

20

40

60

80

FISH NAVIGATION

P/PSH

START LINE 2-O.T.P.
21 Aug 1967 - D.F.S.P.

2/24
1966

2/15
1966

2/2
1967

2/14
1967

2/2
1967

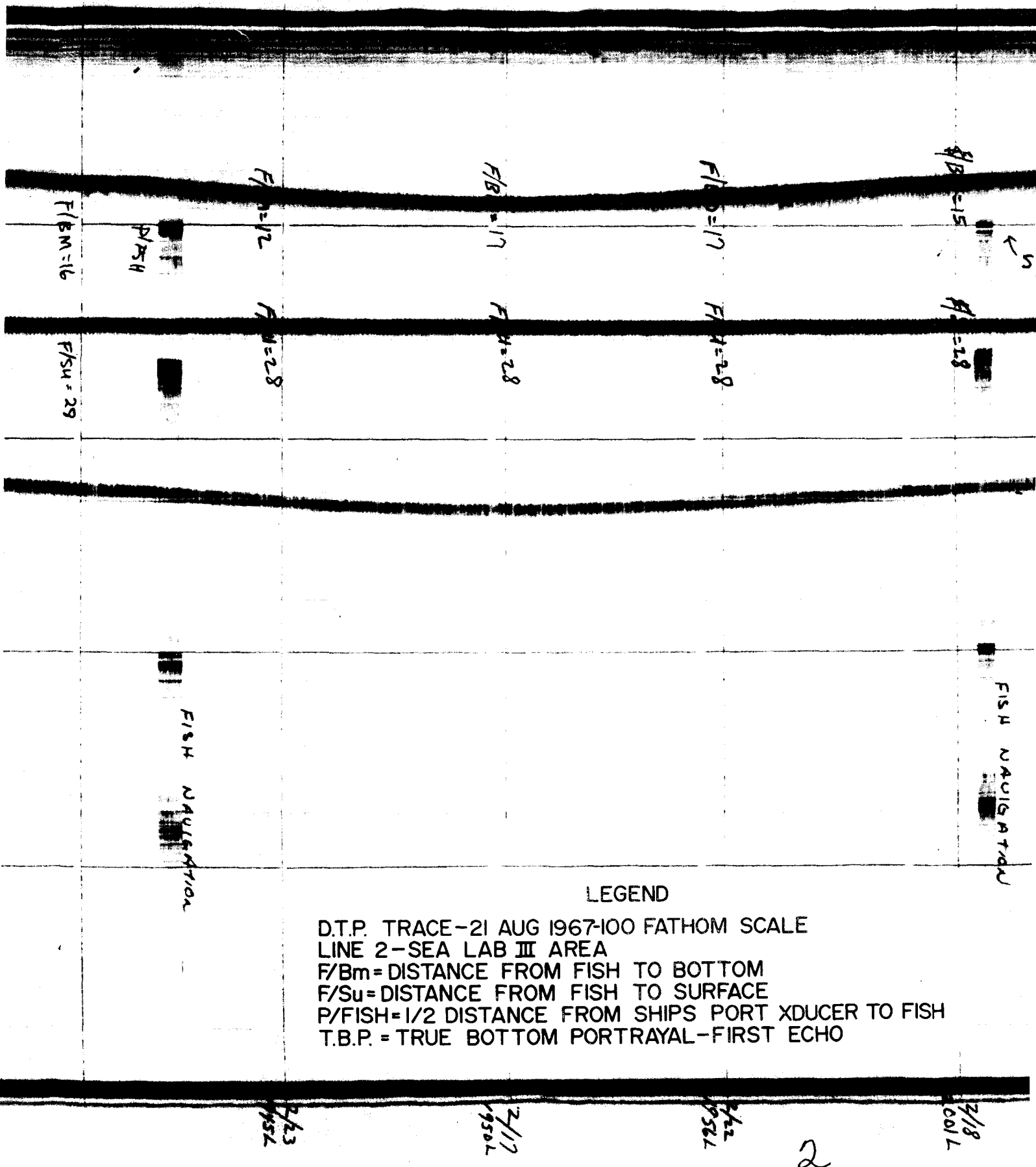


FIGURE 5 PGR TRACE OF LINE 2

F/8-12

F/13

F/14

F/15

↑ S/FSH

↑ S/FSH

F/28

F/28

F/28

F/28

End line #2

FISH NAVIGATION

DUCTER TO FISH
CHO

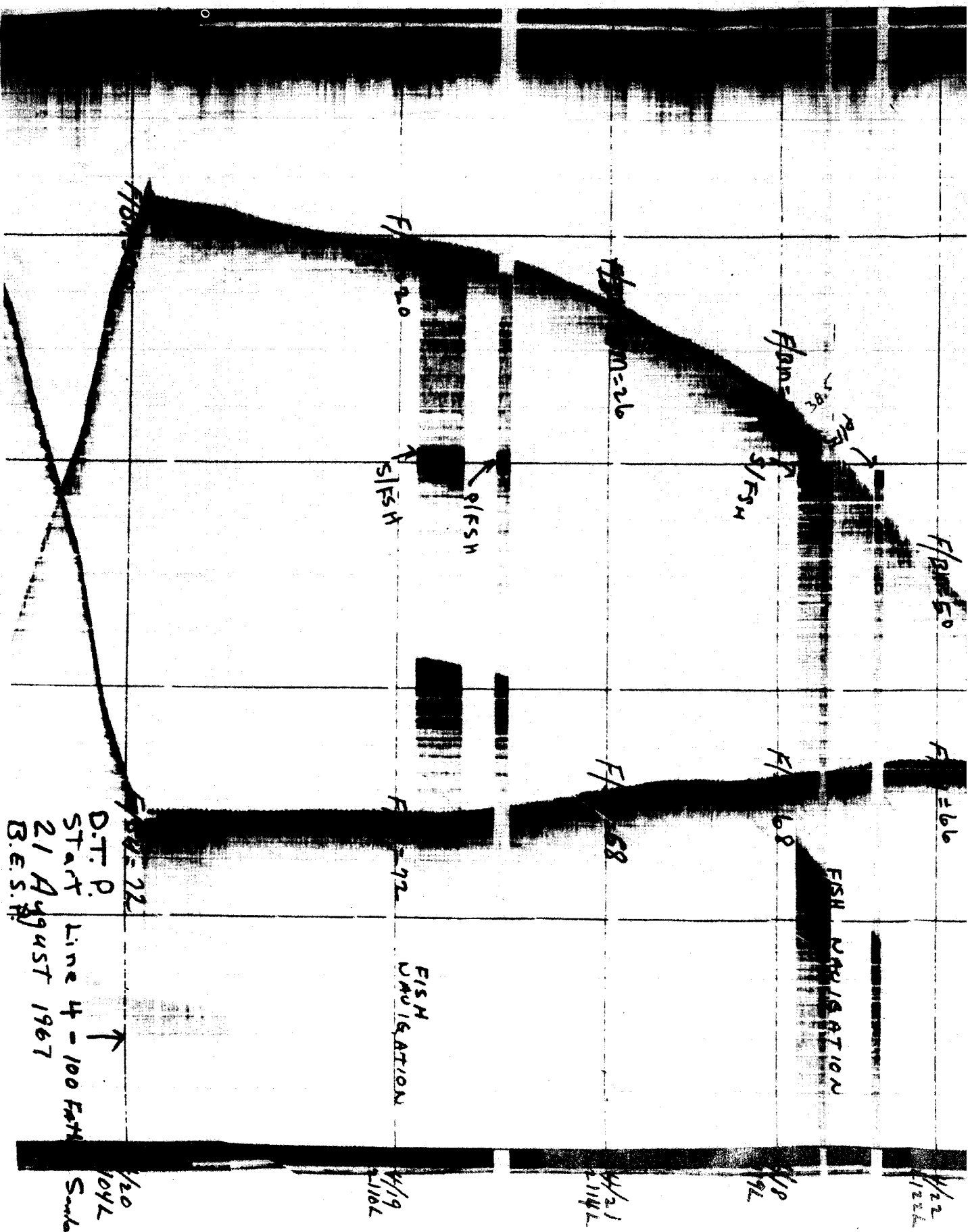
2/20
2012

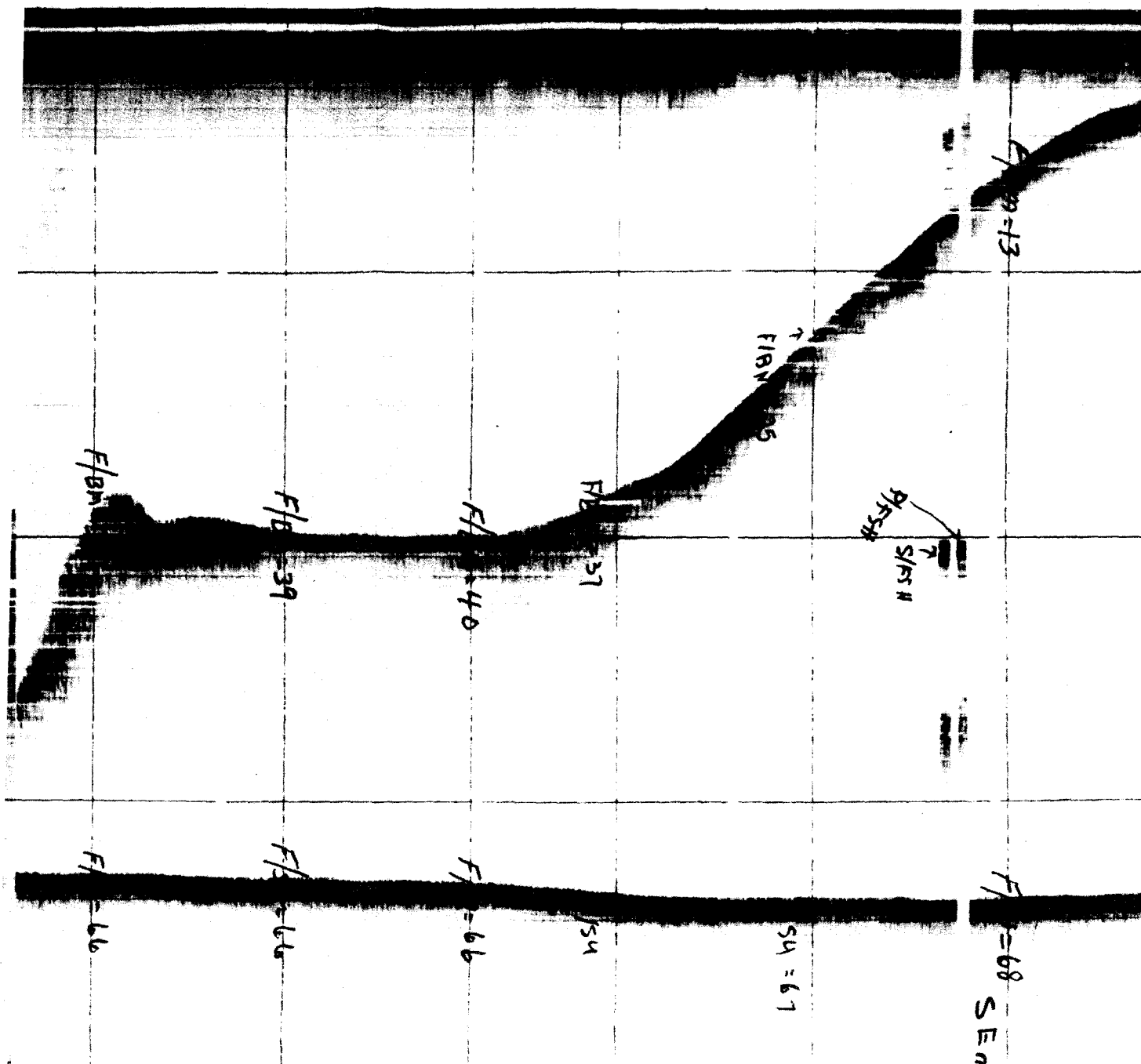
2/19
2012

2/21
2012

2/18
2012

3





LEGEND

D.T.P. TRACE-21 AUG 1967-100 FATHOM SCALE

LINE 4-SEA LAB III AREA

F/Bm=DISTANCE FROM FISH TO BOTTOM

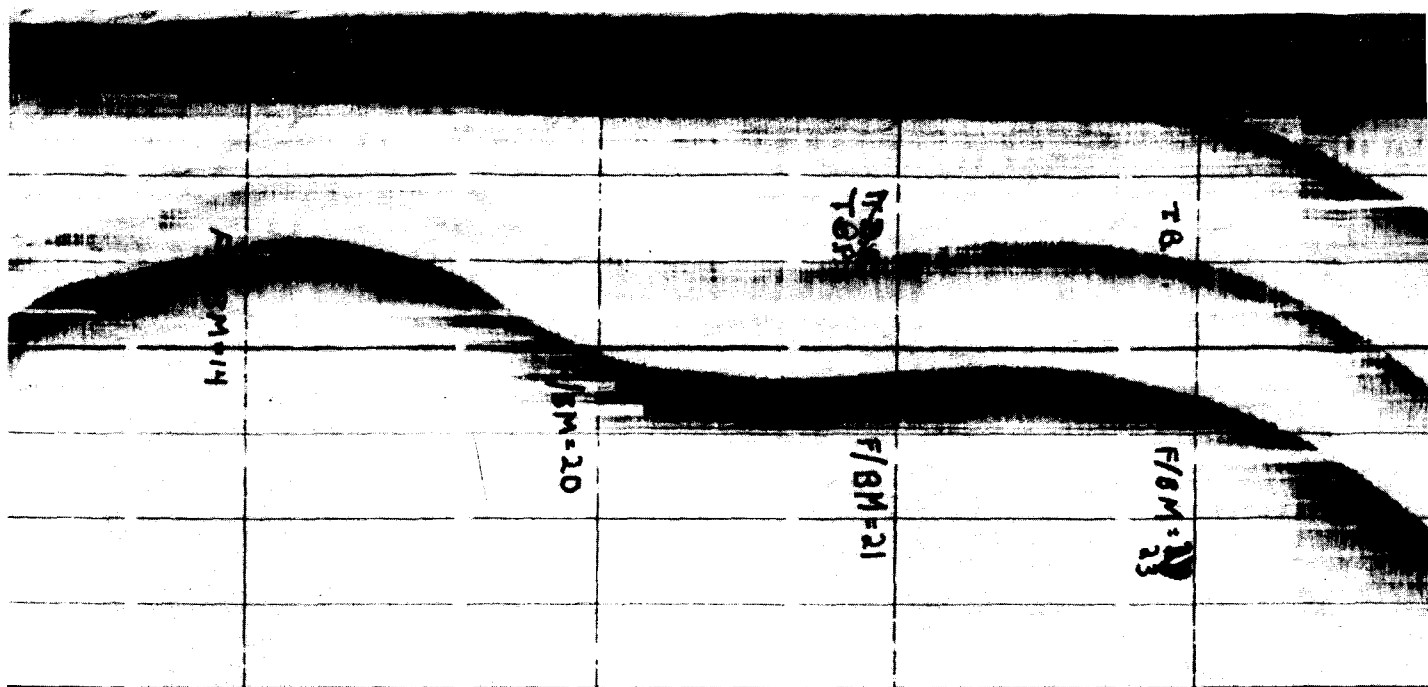
F/Su=DISTANCE FROM FISH TO SURFACE

S/FISH=1/2 DISTANCE FROM SHIPS STARBOARD XDUCER TO FISH

T.B.P.=TRUE BOTTOM PORTRAYAL-FIRST ECHO

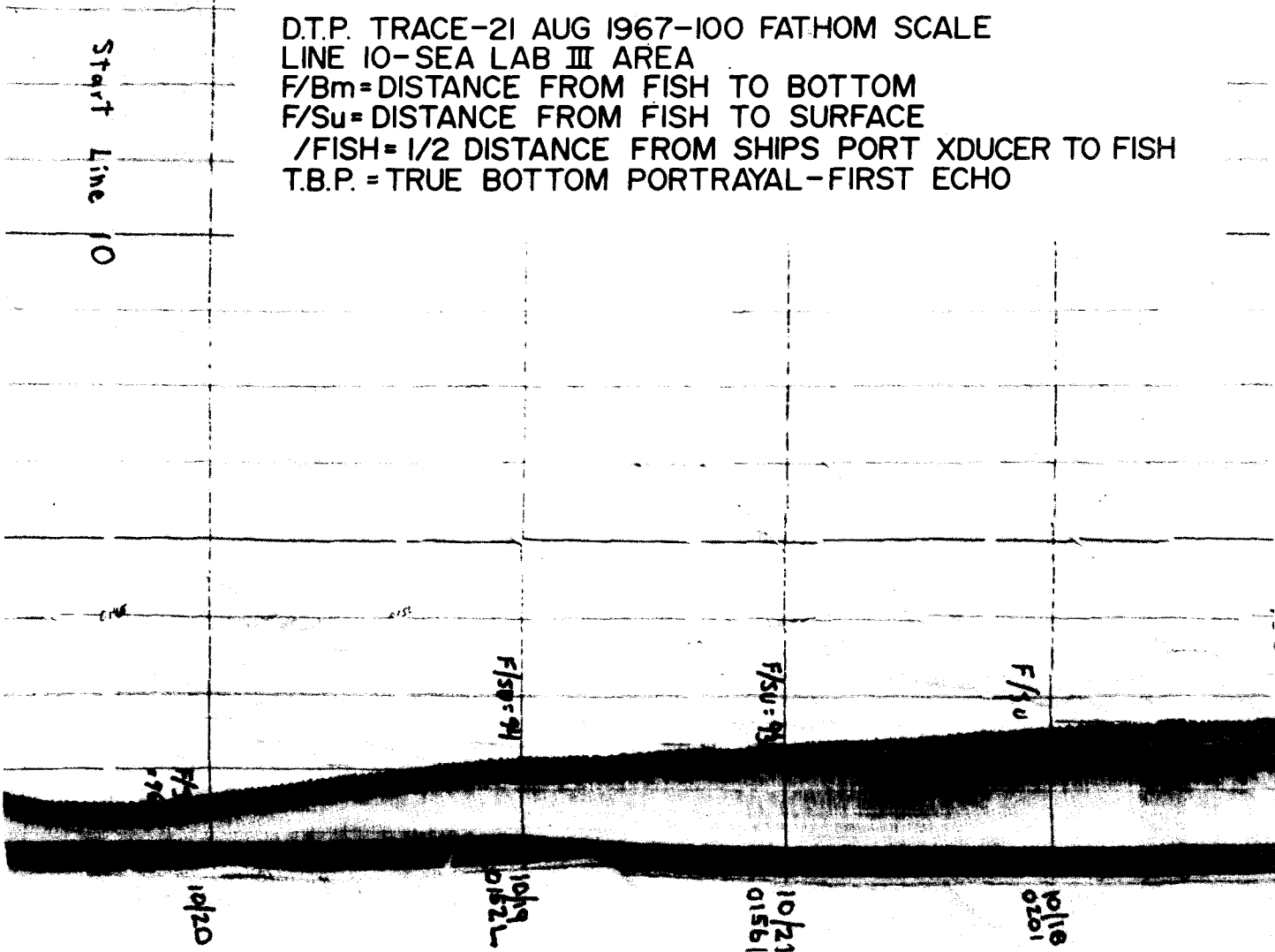
End of line 4 ↑

4/16 2137L
4/24 131L
4/15 2140L
4/15 2143
4/14 2147L
4/12L 2150L



LEGEND

D.T.P. TRACE-21 AUG 1967-100 FATHOM SCALE
 LINE 10-SEA LAB III AREA
 F/Bm=DISTANCE FROM FISH TO BOTTOM
 F/Su=DISTANCE FROM FISH TO SURFACE
 /FISH= 1/2 DISTANCE FROM SHIPS PORT XDUCER TO FISH
 T.B.P. = TRUE BOTTOM PORTRAYAL-FIRST ECHO



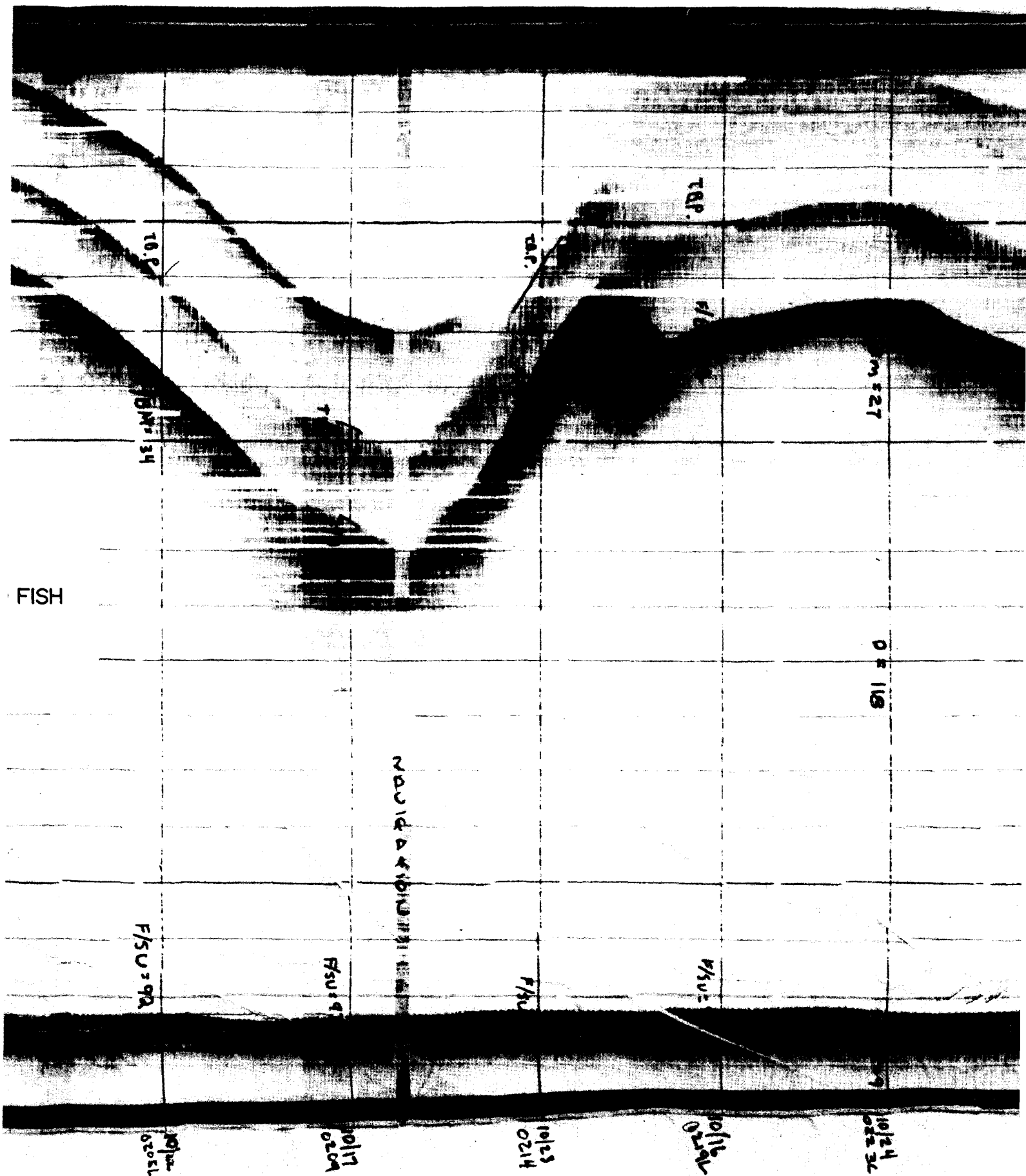
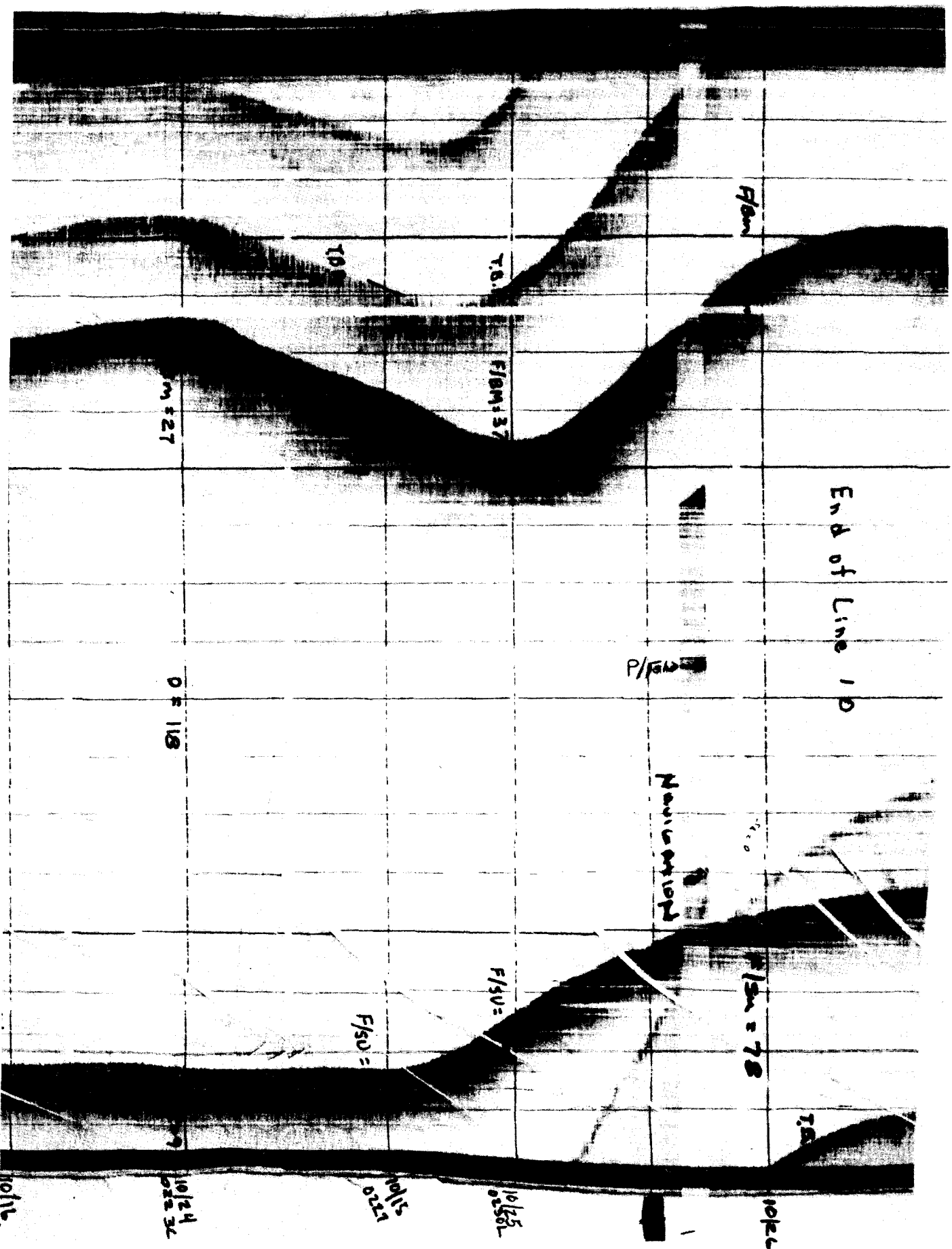


FIGURE 8 PGR TRACE OF LINE 10



III. BOTTOM SAMPLES

General

Four bottom samples were collected in the SEA LAB III area. The locations of the sampling sites are shown in Figure 3.

Methods and Procedures

Three cores were attempted at location #1 with a Kullenberg corer. One other sample was obtained using a Nansen bottle. The samples were analyzed for size at the NAVOCEANO Pacific Support Group Facility at San Diego, California. The analysis were performed using standard laboratory techniques of sieving and pipetting as outlined by Krumbein and Pettejohn (3).

Analysis and Results

Although three coring attempts were made at location #1, only a surface sample of shelly sand was obtained for each attempt. All four of the samples consisted of medium to coarse, organic and nonorganic, shelly sands with traces of volcanic material. Summary and log sheets are presented in Appendix A.

IV. PHYSICAL OCEANOGRAPHY

General

Nansen casts were made in the SEA LAB III area to determine the physical characteristics of the water column.

Methods and Procedures

Temperature and salinity data were taken by standard Nansen casts at five stations in the SEA LAB III area (Figure 3). Water temperatures and sampling depths were obtained with paired protected and unprotected deep-sea reversing thermometers attached to the Nansen bottles. Temperatures and depths were computed in accordance with H.O. Pub. No. 607, (4). The water samples obtained with the Nansen bottles were analyzed for salinity using an inductive salinometer.

The Nansen cast data were calculated, coded, and forwarded to the National Oceanographic Data Center (NODC) for computer calculations of density, sound velocity, specific volume anomalies, and thermometric depths. These data are presented in Appendix B.

Analysis and Results

At station #1, the Nansen bottles were spaced from surface to bottom. At the other four stations, all the bottles were concentrated near the bottom to detect any small deviations from the smooth temperature/depth curve. The maximum temperature measured was 18.46°C at the surface of station #1. The minimum temperature was 6.82°C at 355 meters of station #5. At the bottom of station #5 a small positive temperature gradient was detected.

V. CURRENTS

General

Three current meter arrays were planted at the locations shown in Figure 1. These locations were chosen in order to obtain a representation of the current regime around the perimeter of the SEA LAB III area.

Methods and Procedures

Each of the three arrays consisted of three Geodyne A-101 16mm film recording Current Meters and Geodyne A-393 or Braincon 422 Release Mechanisms. The arrays were planted on 7 July and the releases were programmed to activate on 18 August 1967. A TRB and Patrol Boat from San Clemente Island were used to retrieve #2 and #3 arrays on this date. Array #1 failed to surface. The data on the film was transferred to magnetic tape at NAVOCEANO and the tape was used to prepare speed and direction histograms and a polar coordinate plot of speed versus direction. Zero current speed was not included in the computations. The plots are presented in Figures 9 to 17.

Analysis and Results

Three of the six meters retrieved functioned properly and are referenced in this report. Meter #327 was arrayed 12 feet above the bottom in a water depth of approximately 260 fathoms. Meters #309 and #321 were arrayed 8 feet and 36 feet respectively above the bottom in a water depth of 100 fathoms. The primary direction vectors of all meters are to the southeast and northwest. This indicates that at these locations and depths the current reverses along an axis essentially parallel to San Clemente Island. Although speeds of 0.5 knots were recorded, the predominant current speeds varied from 0.0 to 0.2 knots (0.0 to 10.3 cm./sec.).

CURRENT DIRECTION HISTOGRAM

SCALE - 13.429 OBSERVATIONS =

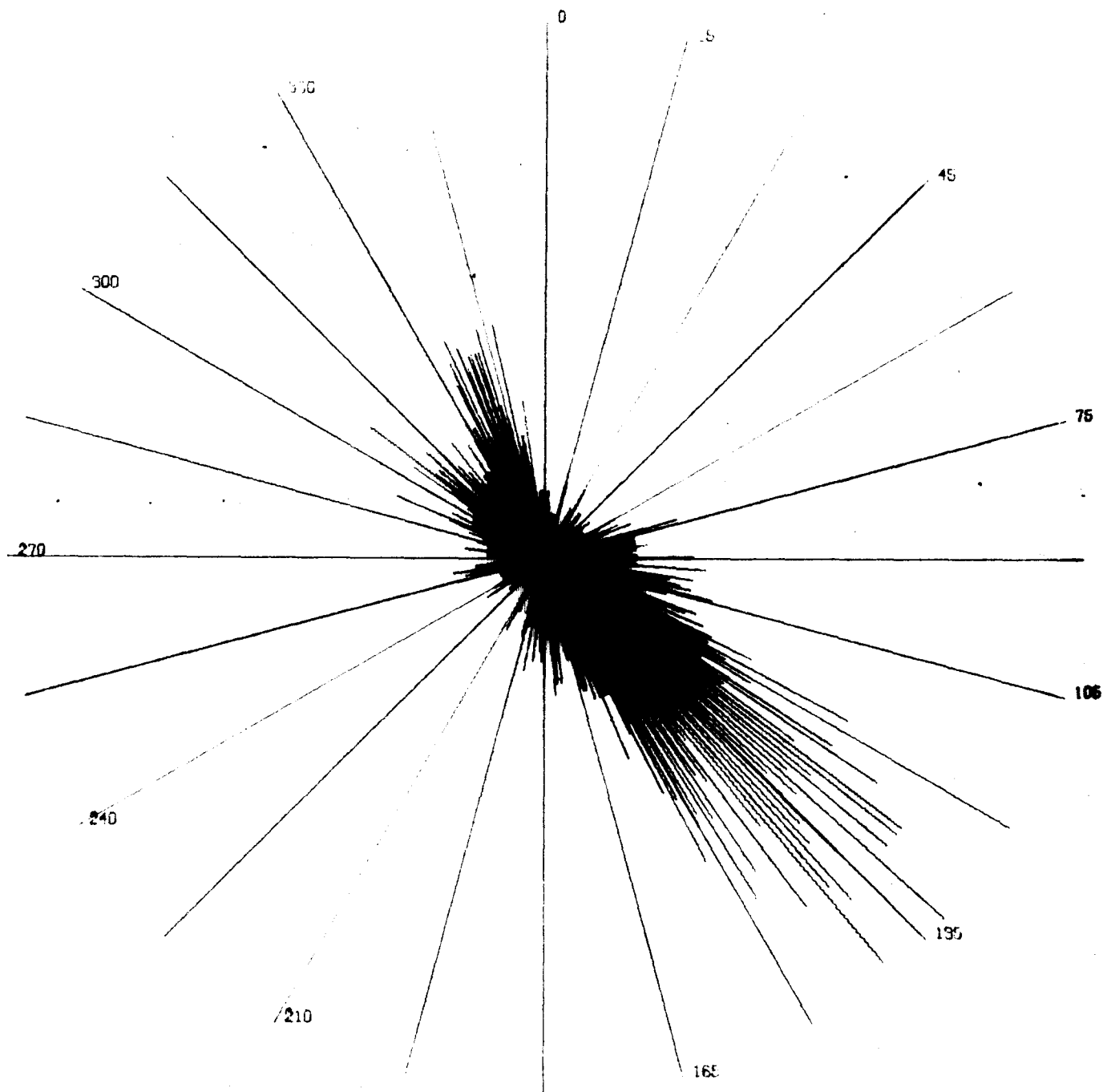
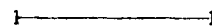


FIGURE 9 CURRENT DIRECTION HISTOGRAM - METER 327

CURRENT SPEED HISTOGRAM

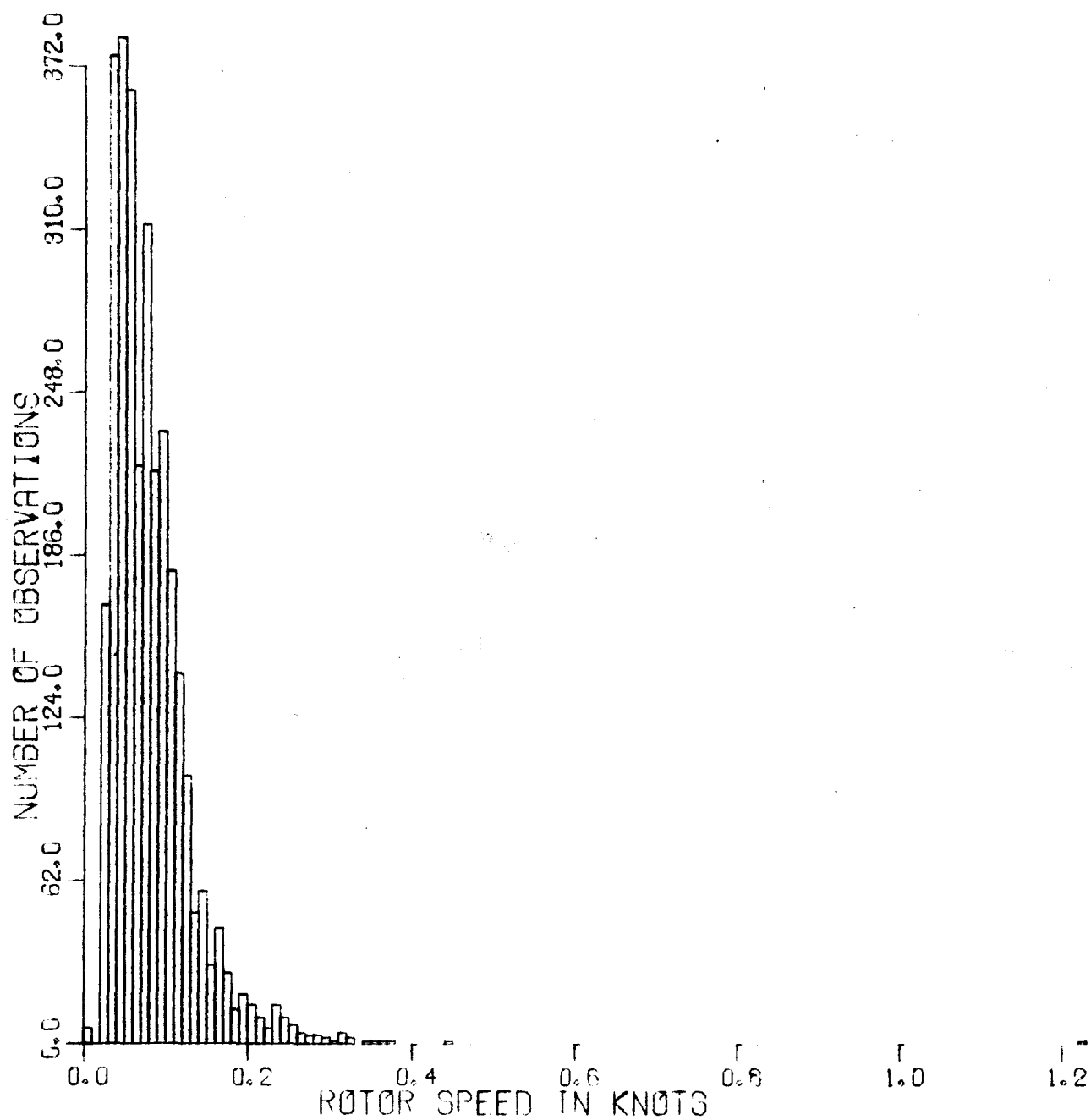


FIGURE 10 CURRENT SPEED HISTOGRAM-METER 327

CURRENT DIRECTION - SPEED PLOT

SCALE - 0.039

KNØTS

=

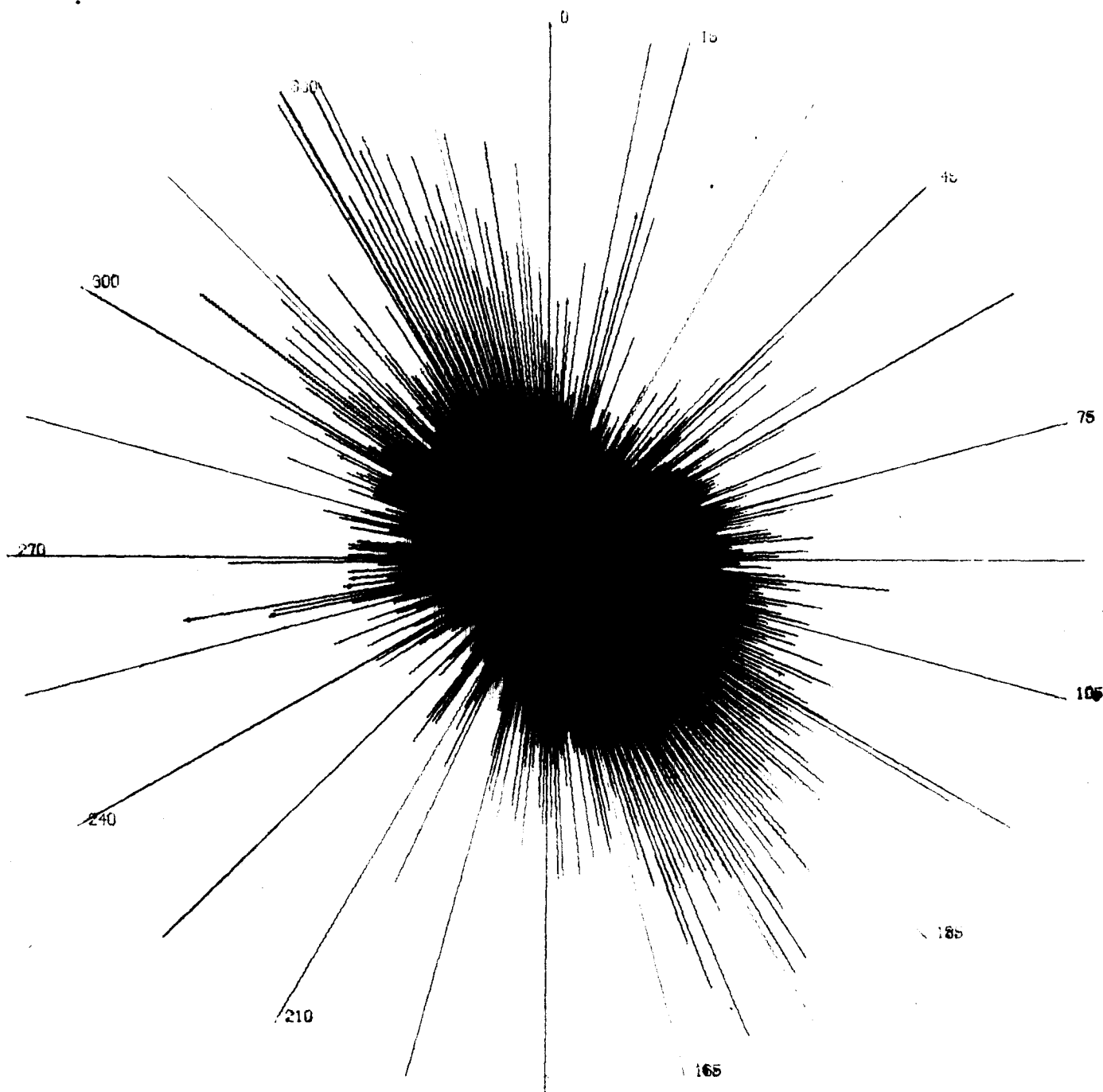
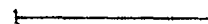
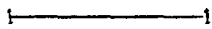


FIGURE 11 CURRENT DIRECTION VS. SPEED - METER 327

CURRENT DIRECTION HISTOGRAM

SCALE - 8.286 OBSERVATIONS = 

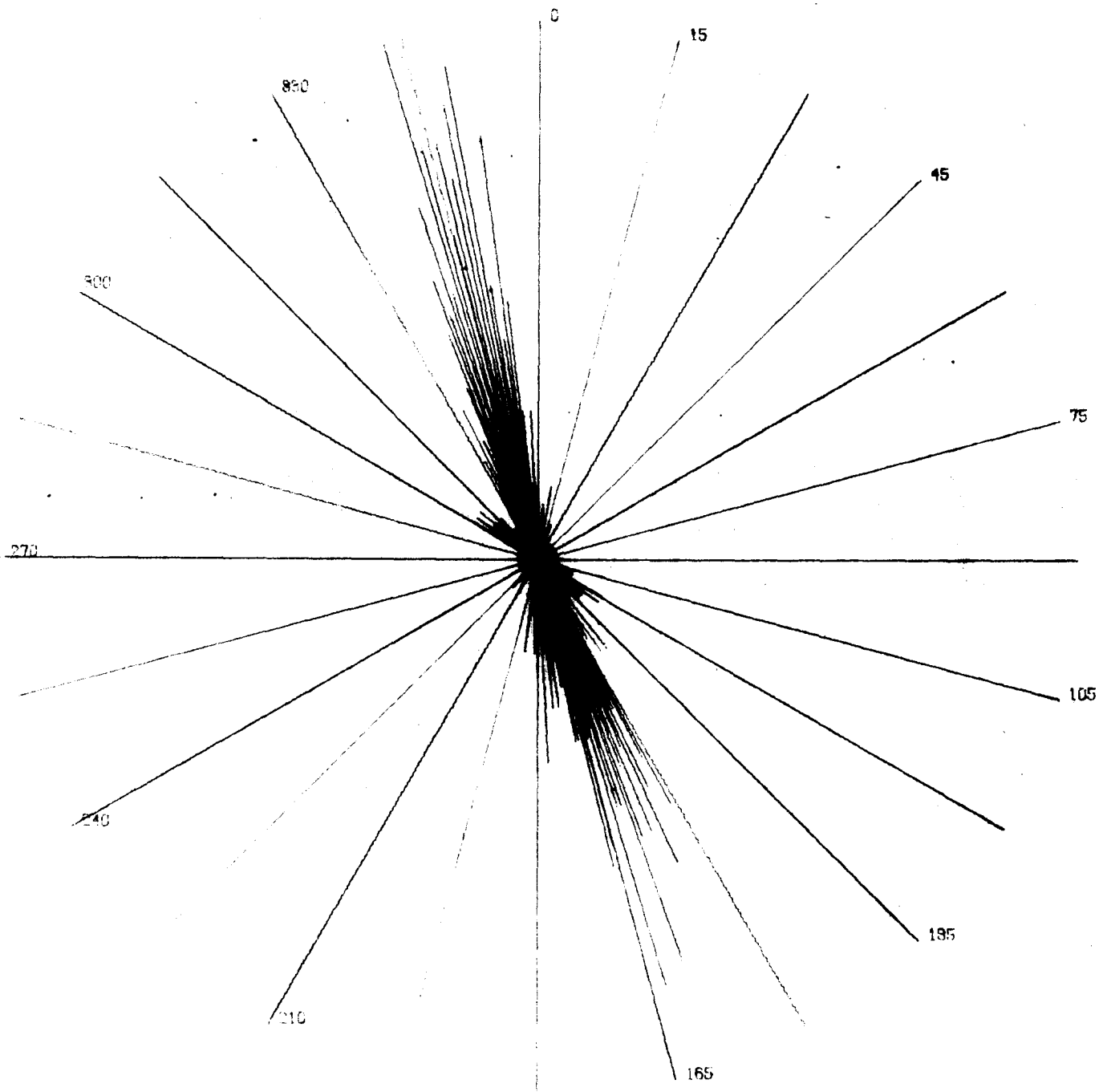


FIGURE 12 CURRENT DIRECTION HISTOGRAM - METER 309

CURRENT SPEED HISTOGRAM

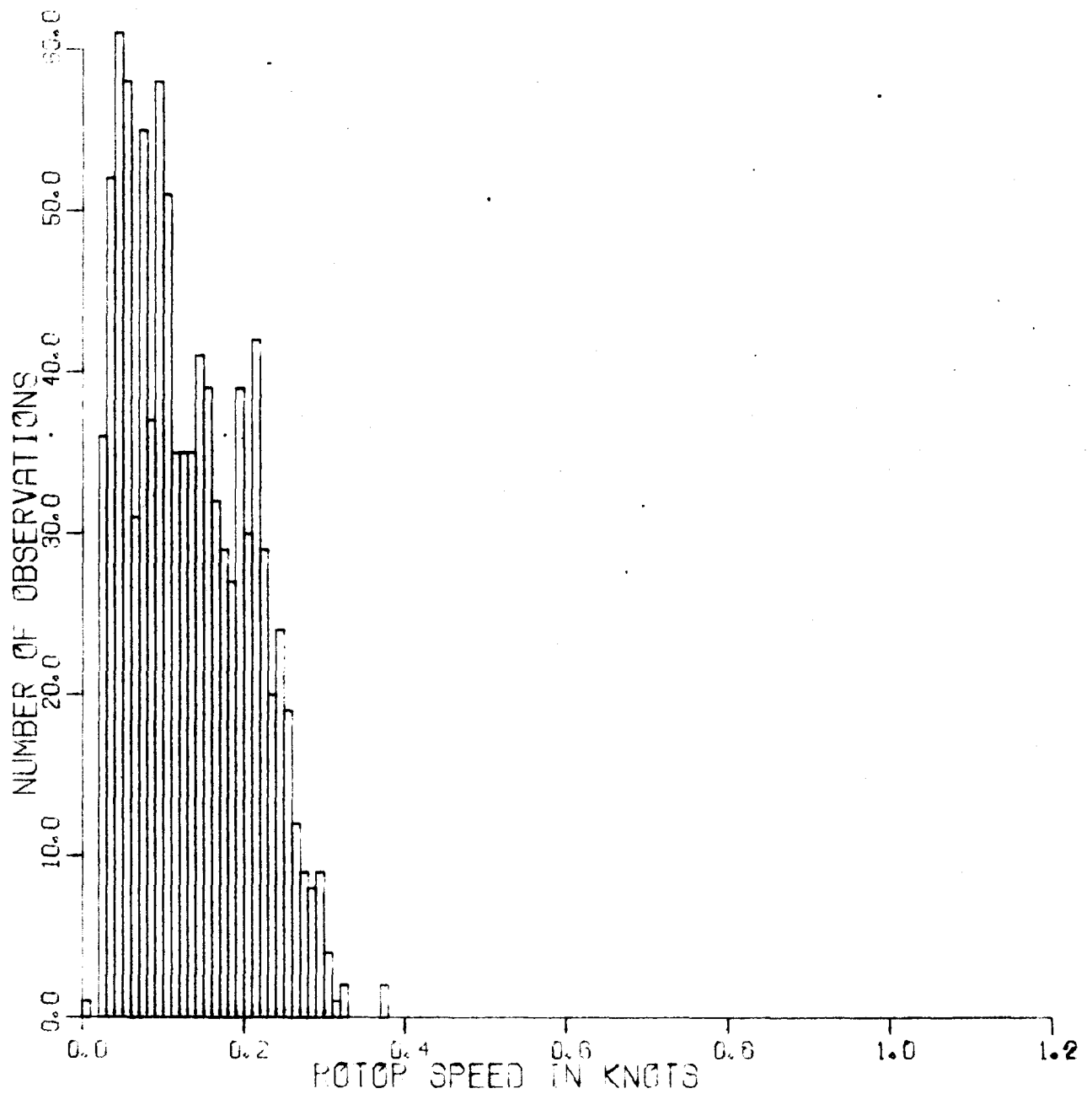


FIGURE 13 CURRENT SPEED HISTOGRAM - METER 309

CURRENT DIRECTION - SPEED PLOT

SCALE - 0.066

KNOTS

=

1

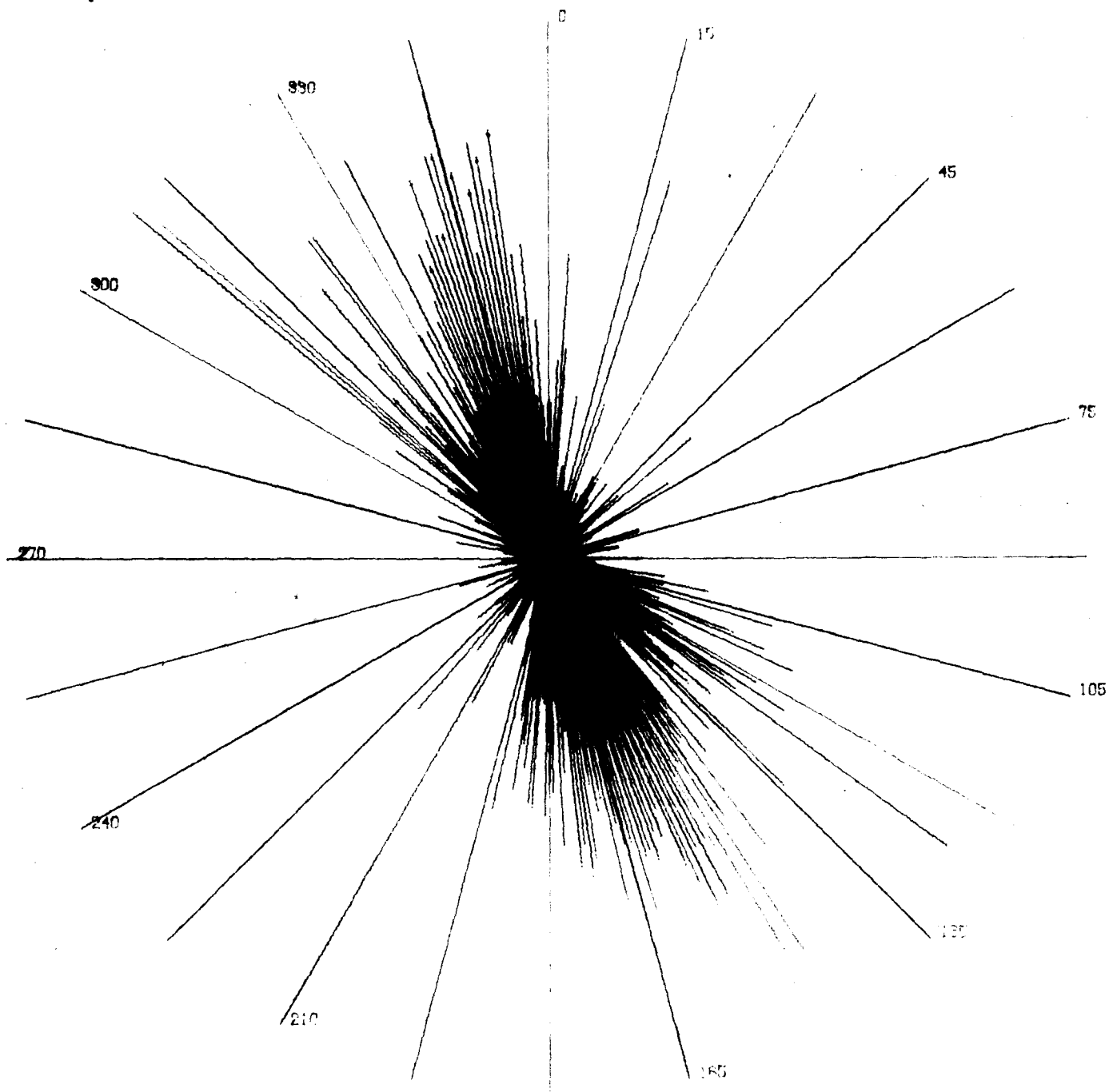


FIGURE 14 CURRENT DIRECTION VS. SPEED-METER 309

CURRENT DIRECTION HISTOGRAM

SCALE - 21.714 OBSERVATIONS

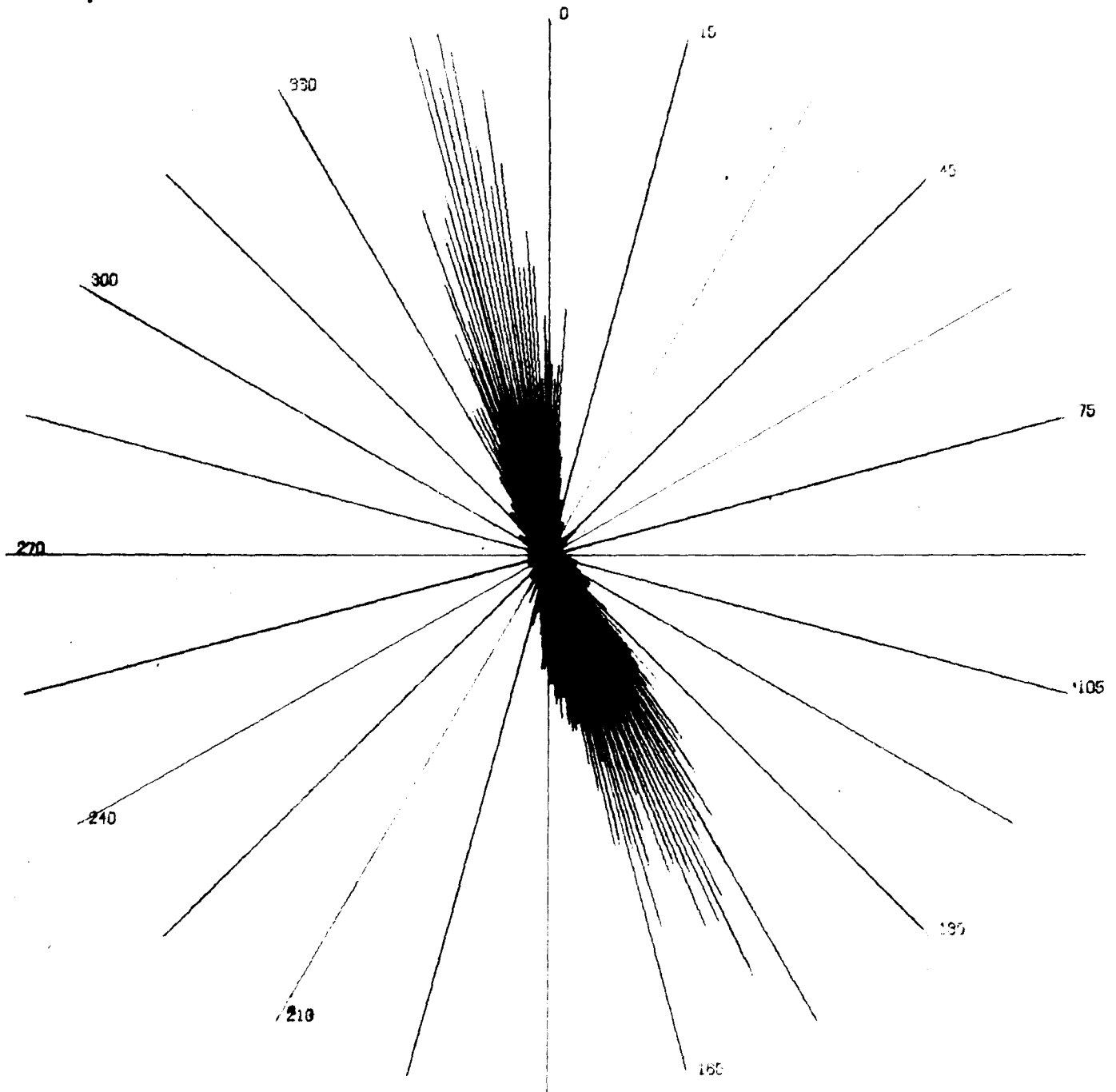


FIGURE 15 CURRENT DIRECTION HISTOGRAM - METER 321

CURRENT SPEED HISTOGRAM

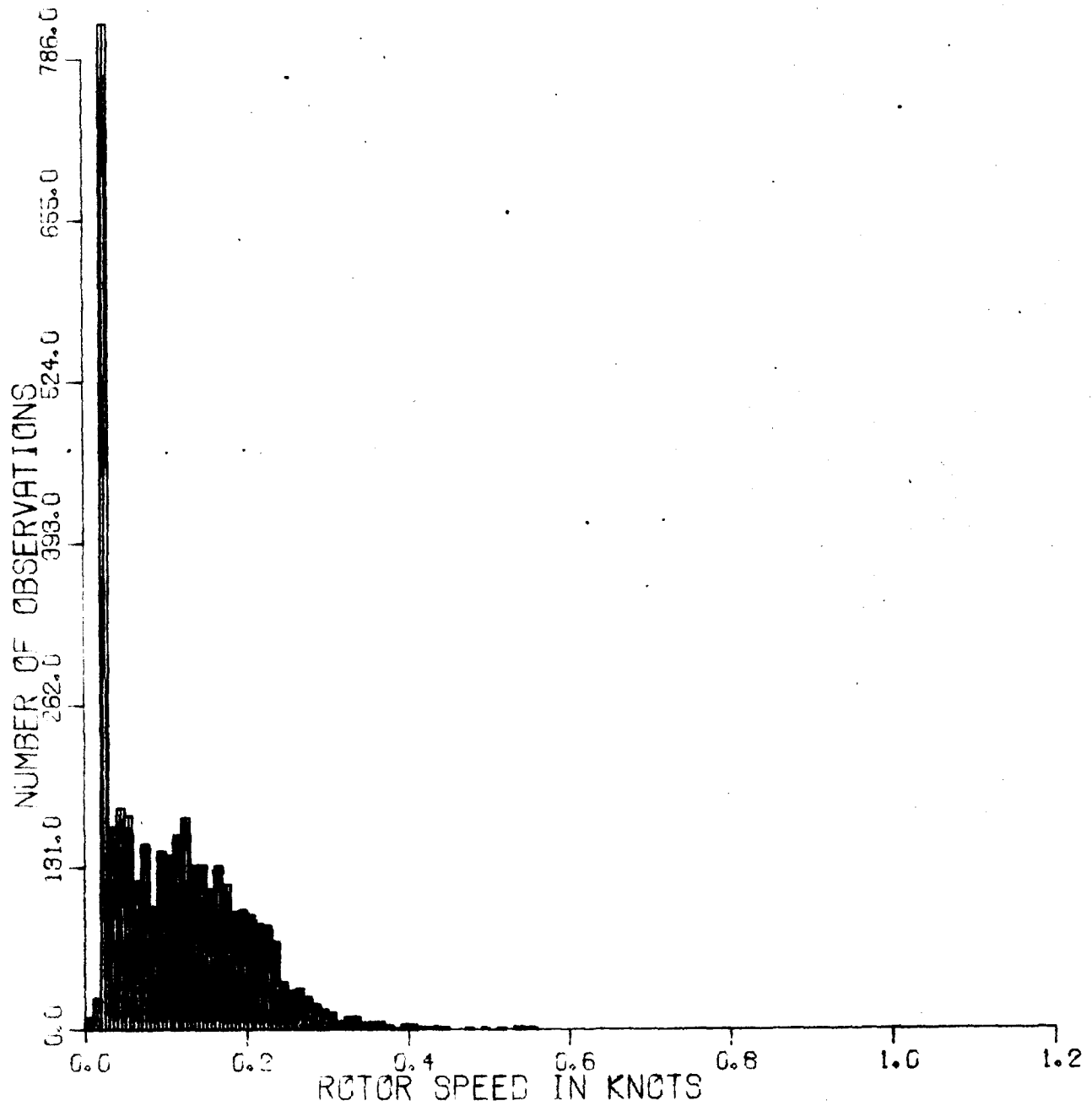


FIGURE 16 CURRENT SPEED HISTOGRAM - METER 321

CURRENT DIRECTION - SPEED PLOT

SCALE - 0.126 KNOTS

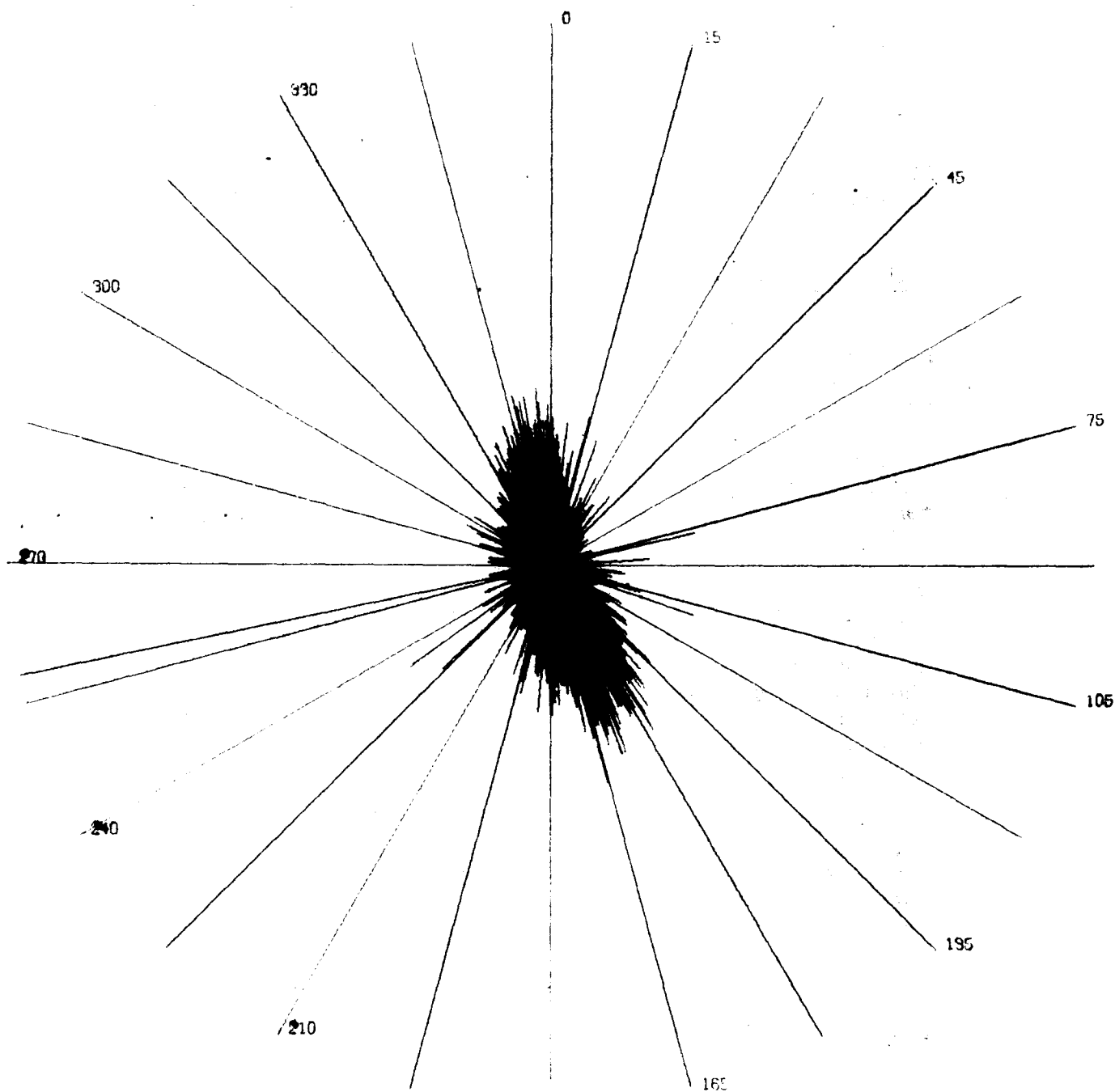


FIGURE 17 CURRENT DIRECTION VS. SPEED - METER 321

VI. BOTTOM ENVIRONMENTAL SENSING SYSTEM

General

The Bottom Environmental Sensing System (BESS) (Figure 18) is an in situ system used to measure the current speed and direction, and temperature (5). It also obtains photographs of the bottom which are subsequently used to determine the maximum/minimum visibility periods and sediment characteristics. The system was used operationally for the first time during this survey. It was deployed at 1815L 21 August 1967 in 42 fathom and retrieved 1800L 22 August at 32°59' 13.2"N and 118°31' 42.7"W as determined by Randall Radar on S.C.I.

Methods and Procedures

The current and temperature data were collected using a Hydro Products Model 501 In Situ Current Meter. This system utilizes a Savonius rotor to measure the current speed to $\pm 3\%$, magnetic compass to measure direction to $\pm 5\%$, and a thermistor to measure temperature to $\pm 3\%$. These data were plotted on a Rustrak recorder strip chart (Figures 19 & 20). The current speed and direction and temperature readings were scaled every 15 minutes, tabulated (Table I) and graphed as a function of time (Figure 21).

An E.G.&G. Model 205/206 Camera/Strobe System synchronized with a specially designed sequence timer was used to obtain bottom pictures, visibility data, and sediment characteristics. The relative maximum/minimum visibility periods were determined using two target rods painted with white and gray rectangles. The 35mm camera obtained a photograph of these targets every hour during deployment. The film was developed and densities were measured with a 0.5mm aperture densitometer. These densities were then plotted as a function of time (Figure 22).

Penetrometers were used to gain an index of the sediment strength characteristics. Prior to deployment, two penetrometers were fastened to the BESS with magnesium wire. This wire corroded due to the effect of salt water allowing the penetrometers to fall and imbed in the sediment. After the penetrometers are calibrated (penetration vs. shear strength), an index of the sediment shear strength will be ascertained from the photographs.

Analysis and Results

Currents. Of the 93 current speed and temperature readings scaled from the strip chart recording, 26 were below 0.5 knots, 47 were 0.5 knots, and 20 were above 0.5 knots. The minimum speed of 0.3 knots occurred at 1915L 21 August. The maximum speed of 0.7 knots occurred between 0430-0500L 22 August. The current direction trace on the recording is off scale and although a constant vector to the north is indicated, it is considered questionable. The temperature readings vary between 11.0°C and 12.0°C.

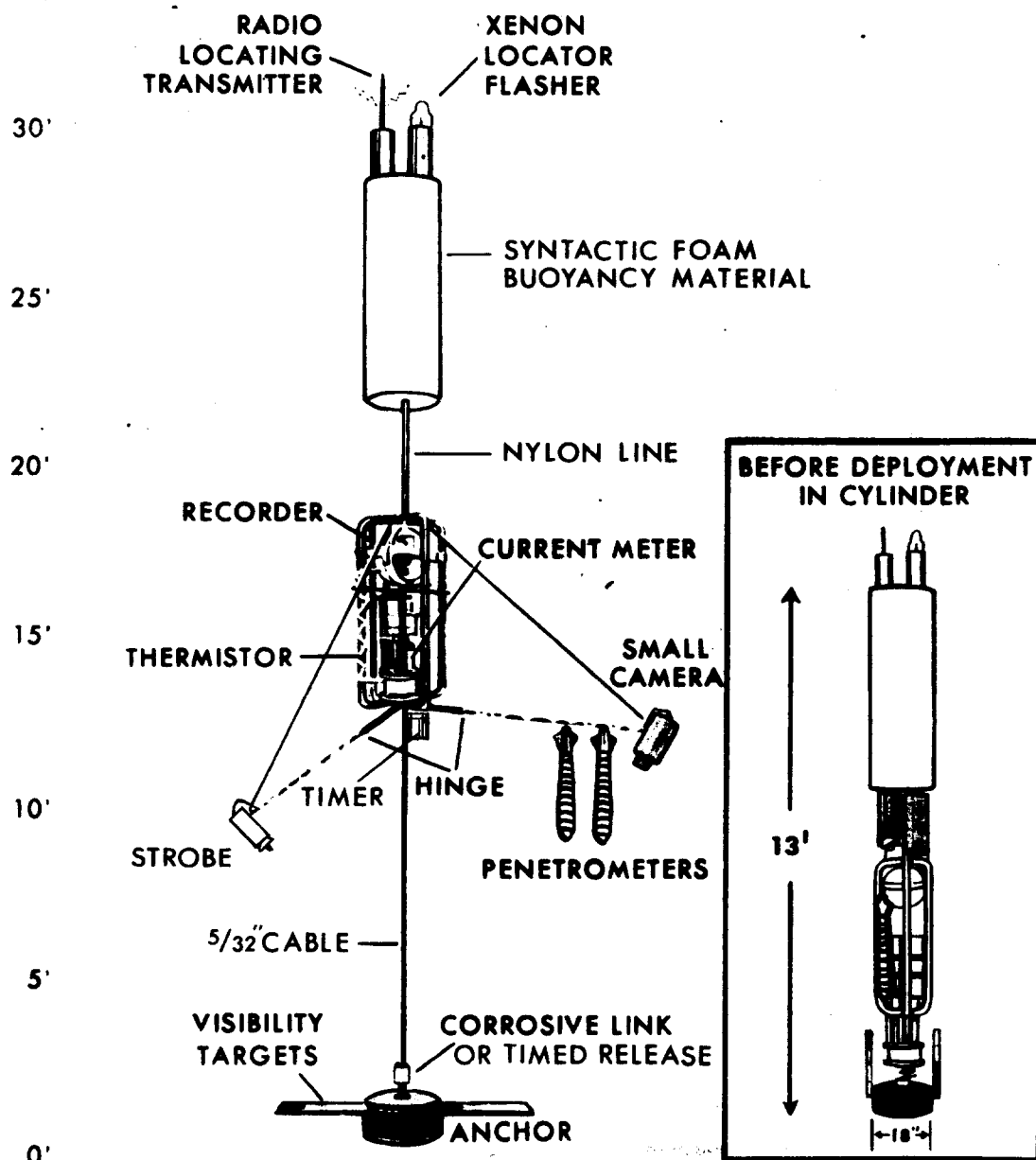
Visibility. Inasmuch as the BESS was planted in only 42 fathoms, the effect of ambient light during the daylight hours is evident (Figure 22). However, the relative maximum/minimum visibility periods can still be determined from the plot. As the densities change with time, it can be stated that visibility in the area is decreasing or increasing due to a change in the volume of backscatterers present in the water mass. The visibility minimums (increase in volume of backscatterers with a corresponding increase in film density) occur at 1915, 2215, 0215, 1215, 1515L. The visibility maximums (decrease in volume of backscatterers) occur at 2015, 0015, 0515, 0915, 1415L. It is interesting to note that the excursions of the visibility plot coincide with the excursions of the current speed and temperature plots. For example, the visibility maximum at 0515L coincides with the current speed maximum of 0.7 knots and very near the temperature maximum of 12.0°C.

Sediment. Figure 23 shows the sea floor, visibility targets, and penetrometers. One of the penetrometers is shown laying on its side which is probably due to its hitting a target rod, rock, or shell fragment on the bottom. The other penetrometer is imbedded about 5" indicating a hard bottom. This was substantiated during coring operations when only short sandy cores were obtained.

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BOTTOM ENVIRONMENTAL SURVEY PROJECT



BOTTOM ENVIRONMENTAL SENSING SYSTEM

MEASURING VISIBILITY, SEDIMENT STRENGTH, CURRENTS,
TEMPERATURE, and TAKING BOTTOM PHOTOGRAPHS

FIGURE 18 BOTTOM ENVIRONMENTAL SENSING SYSTEM

CURRENT DIRECTION

CURRENT SPEED

TEMPERATURE

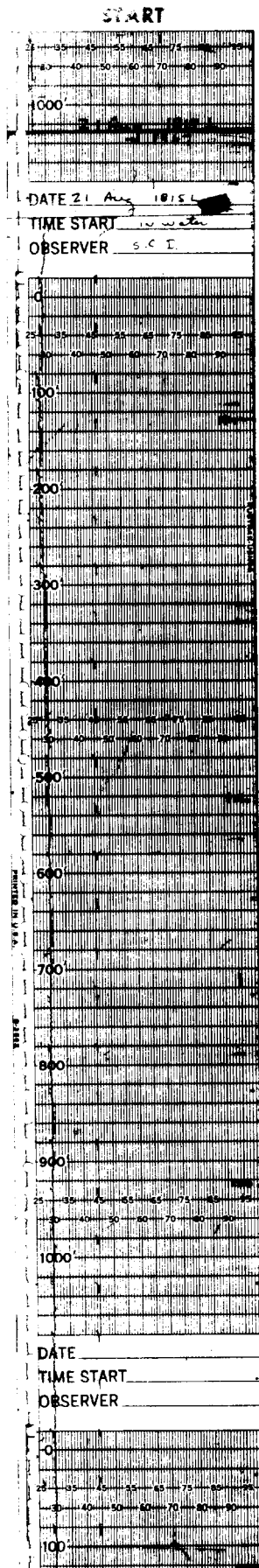
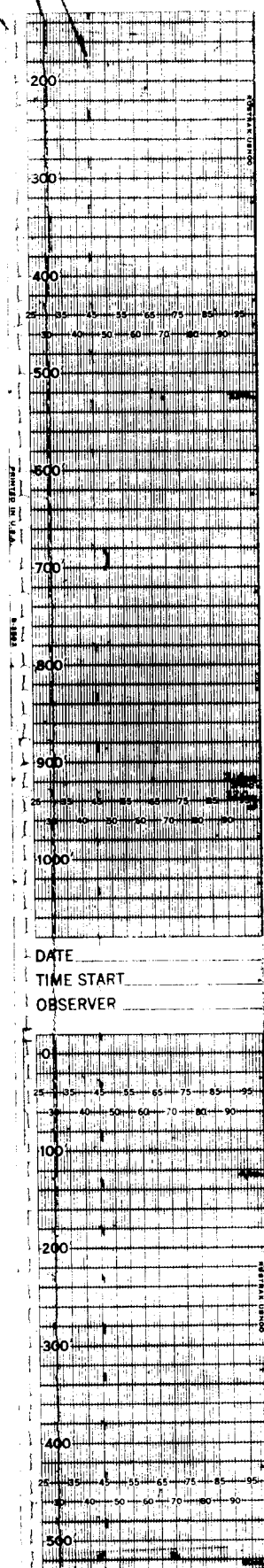
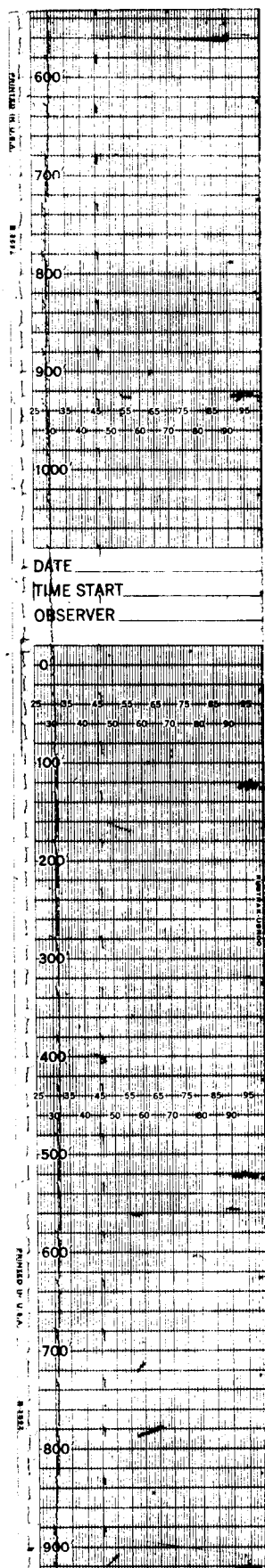


FIGURE 19 CURRENT METER RECORD 21 1815 AUG. TO 22 0600 AUG. 1967

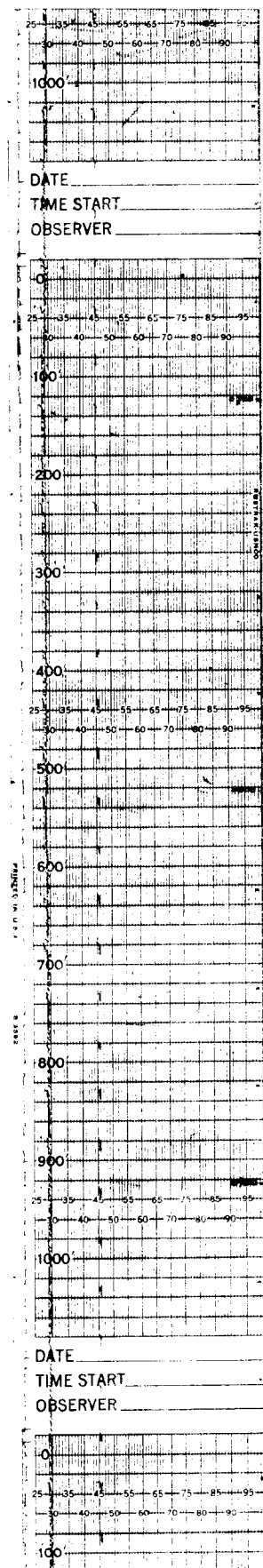
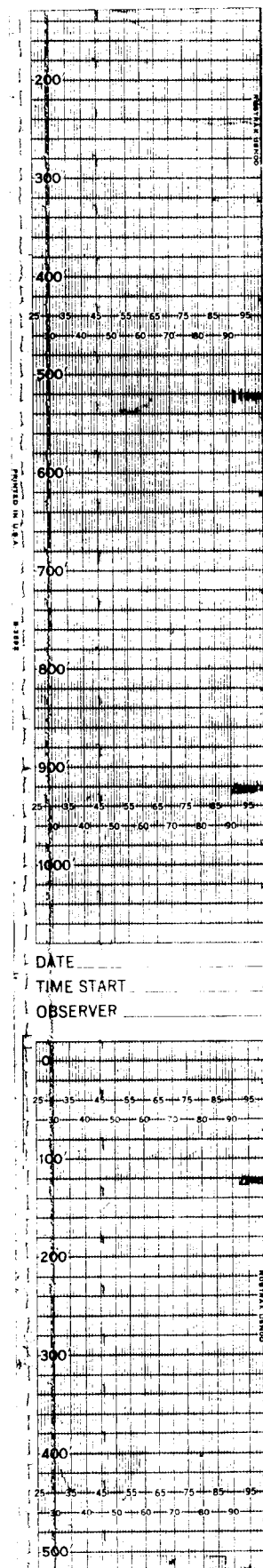
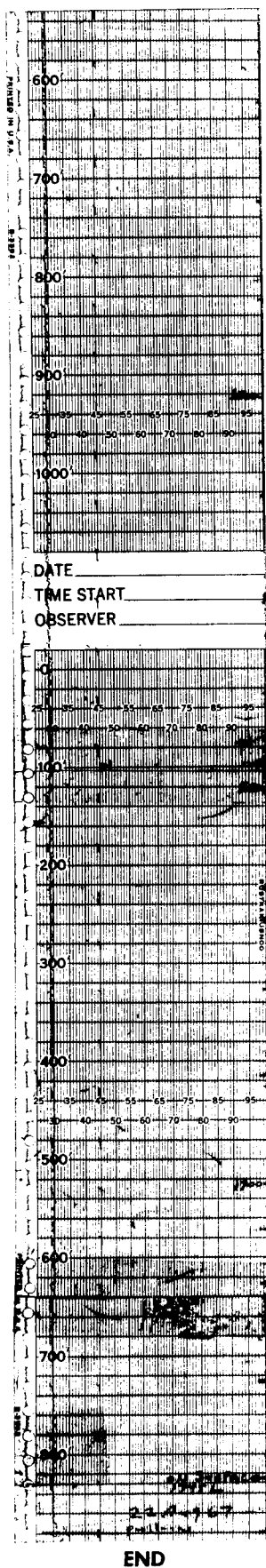


FIGURE 20 CURRENT METER RECORD 22 0600 AUG. TO 22 1745 AUG. 1967

Local Time	Current Speed	Current Direction	Water Temp °C	Local Time	Current Speed	Current Direction	Water Temp °C
21 Aug 67				0600	.50	Vector to	11.0
1815	Equipment Deployed			0615	.50	North	11.0
1830	Unsettled	Vector to		0630	.50	"	11.0
1845	.50	North	12.0	0645	.50	"	11.0
1900	.40	"	12.0	0700	.40	"	11.0
1915	.30	"	11.5	0715	.40	"	11.0
1930	.50	"	11.5	0730	.40	"	11.5
1945	.50	"	11.5	0745	.40	"	11.5
2000	.50	"	11.5	0800	.40	"	11.5
2015	.50	"	11.5	0815	.40	"	11.5
2030	.50	"	11.0	0830	.40	"	11.5
2045	.50	"	11.0	0845	.40	"	11.5
2100	.50	"	11.0	0900	.45	"	11.5
2015	.50	"	11.0	0915	.50	"	11.5
2030	.50	"	11.0	0930	.50	"	11.5
2045	.50	"	11.0	0945	.50	"	11.5
2200	.50	"	11.0	1000	.50	"	11.5
2215	.50	"	11.0	1015	.50	"	11.0
2230	.60	"	11.0	1030	.50	"	11.0
2245	.60	"	11.0	1045	.50	"	11.0
2300	.60	"	11.0	1100	.50	"	11.0
2315	.60	"	11.0	1115	.50	"	11.0
2330	.60	"	11.0	1130	.45	"	11.0
2345	.60	"	11.0	1145	.45	"	11.0
2400	.60	"	11.0	1200	.45	"	11.0
22 Aug 67				1215	.45	"	11.0
0015	.60	"	11.0	1230	.45	"	11.5
0030	.60	"	11.5	1245	.45	"	11.5
0045	.60	"	11.5	1300	.50	"	11.5
0100	.50	"	11.5	1315	.50	"	11.5
0115	.50	"	11.5	1330	.50	"	11.5
0130	.50	"	11.5	1345	.50	"	11.5
0145	.50	"	11.5	1400	.50	"	11.5
0200	.50	"	11.5	1415	.50	"	11.5
0215	.50	"	11.5	1430	.50	"	11.0
0230	.45	"	11.5	1445	.50	"	11.0
0245	.45	"	11.5	1500	.50	"	11.0
0300	.45	"	12.0	1515	.45	"	11.0
0315	.50	"	12.0	1530	.45	"	11.0
0330	.55	"	12.0	1545	.45	"	11.0
0345	.60	"	12.0	1600	.40	"	11.0
0400	.65	"	12.0	1615	.40	"	11.0
0415	.65	"	12.0	1630	.45	"	11.0
0430	.70	"	11.5	1645	.50	"	11.0
0445	.70	"	11.5	1700	.50	"	11.0
0500	.70	"	11.5	1715	.50	"	11.0
0515	.60	"	11.5	1730	.50	"	11.0
0530	.60	"	11.5	1745	.50	"	11.0
0545	.55	"	11.5	1800	unsettled		

TABLE I. BESS Current Speed and Direction and Water Temperature

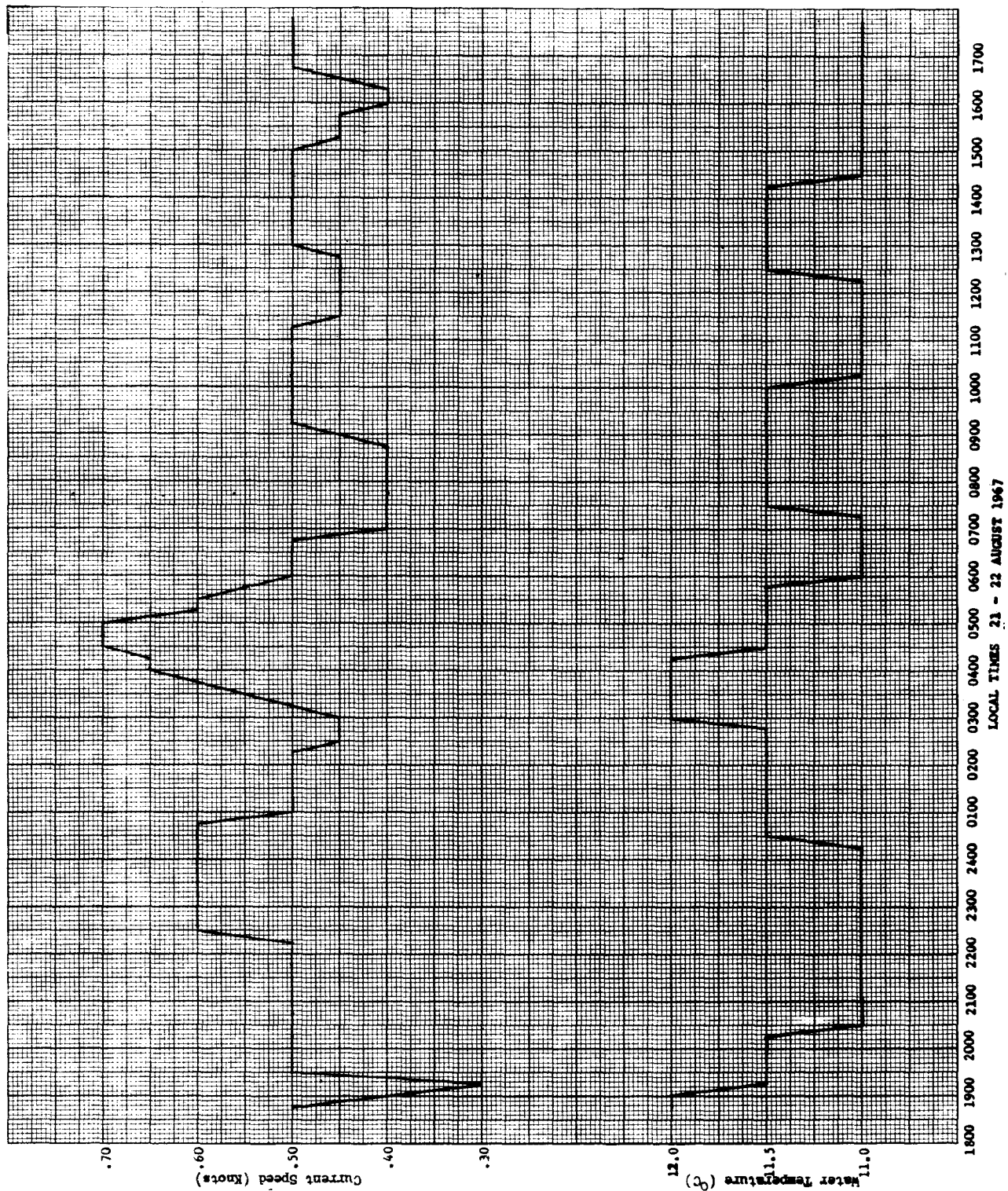


FIGURE 21 CURRENT SPEED AND WATER TEMPERATURE

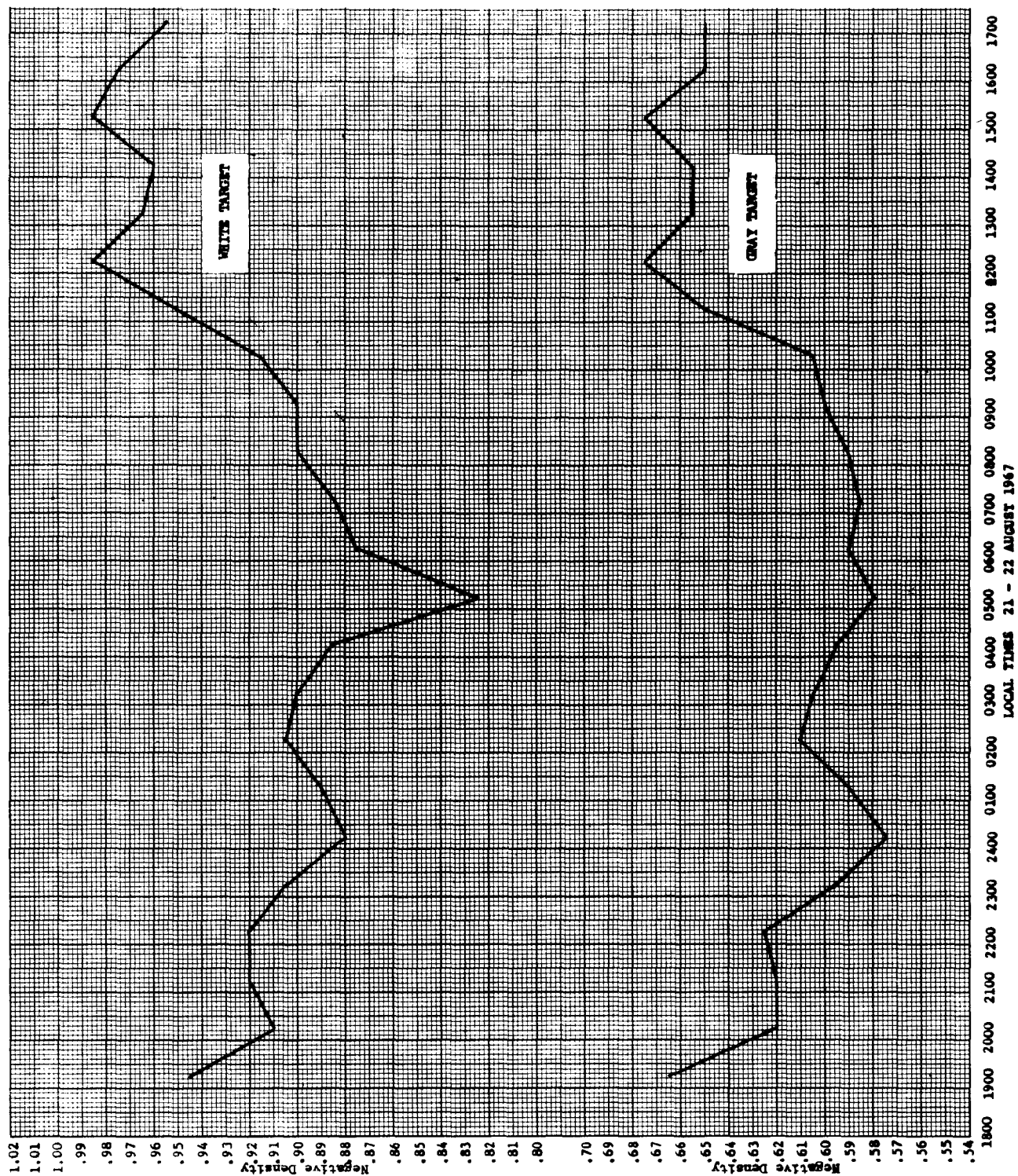


FIGURE 22 BESS TARGET DENSITIES

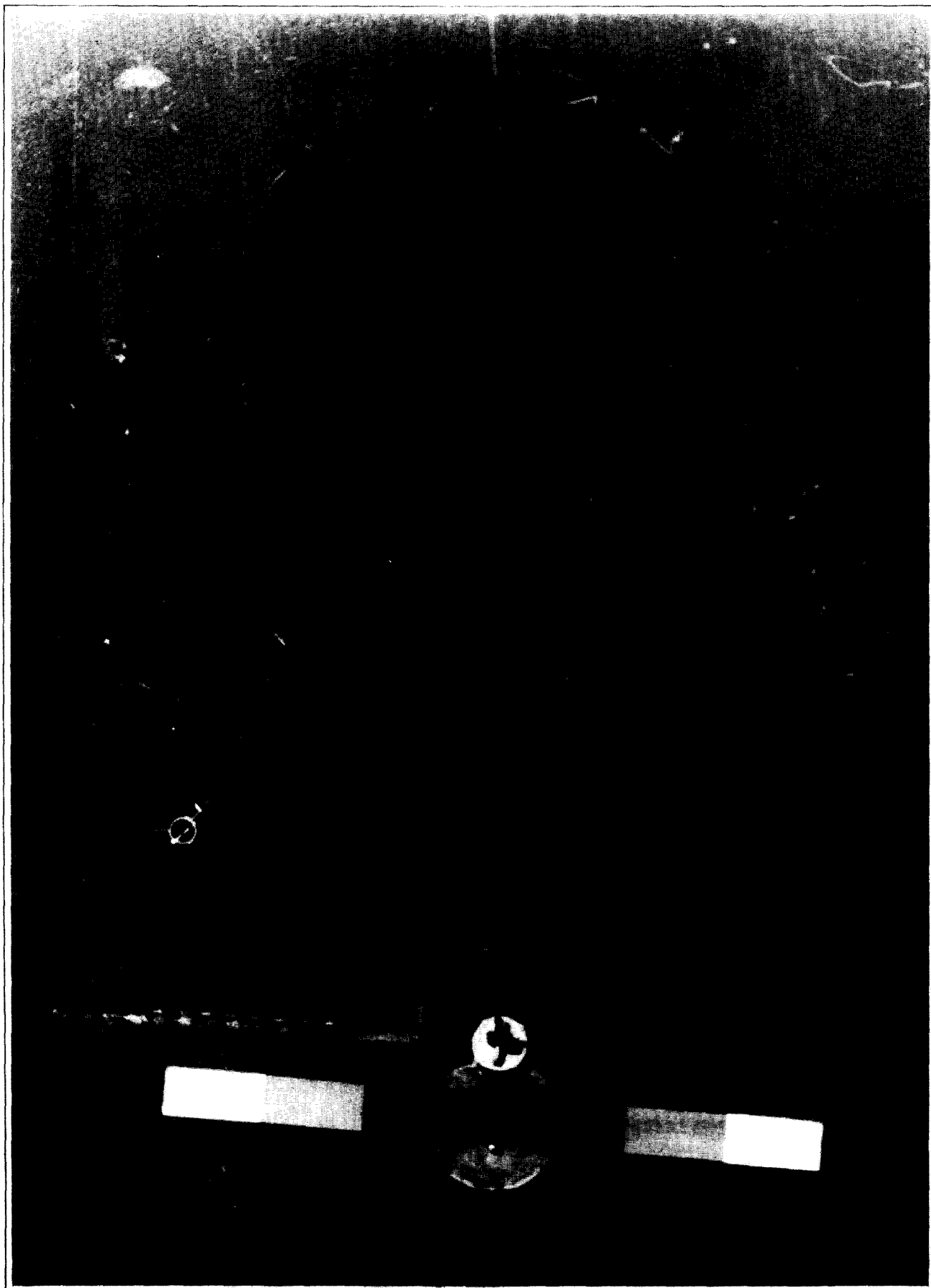


FIGURE 23 PHOTO OF SEA FLOOR VISIBILITY TARGETS AND PENETROMETERS

VII. SEA FLOOR PHOTOGRAPHS OF SEA LAB III AREA

General

Sea floor photographs were obtained in the SEA LAB III area on 5 and 6 July 1967 along the tracks shown in Figure 24. These photographs show a variety of bottom types.

Methods and Procedures

An E.G. &G. Model 204/214 Camera/Strobe System with 35mm Kodak Tri-X film was used to obtain the photographs. This system was mounted on a frame designed to photograph in a plane 30° from the horizontal (Figure 25). This oblique orientation of camera and light source produced a shadow affect which improved the definition of the bottom's smaller features. The addition of fins to the frame made it possible to tow the camera system along the desired tracks. The DAVIS was navigated by Randall Radar on San Clemente Island.

Analysis and Results

Quasi-photo mosaics of the SEA LAB III area sea floor are shown in Figures 26 through 29. The bottom is alternately smooth and flat, steep, and boulder strewn. There was insufficient time during the survey to obtain sufficient bottom photographs to make a reasonably complete pictorial presentation of the bottom. Additional photographic runs should be made before a detailed chart depicting the sea floor characteristics of the SEA LAB III area can be constructed.

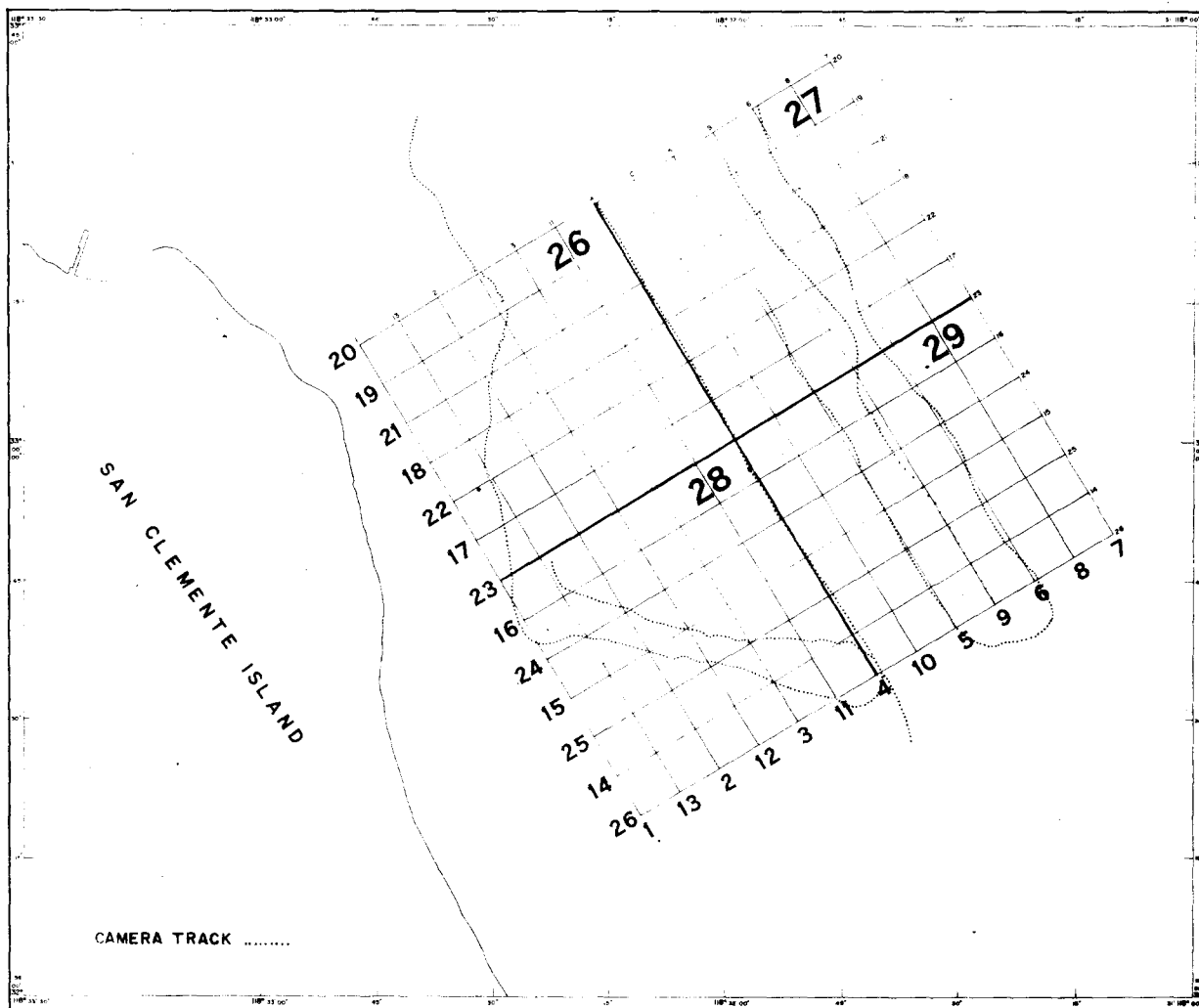


FIGURE 24 LOCATIONS OF SEA FLOOR PHOTOGRAPHS AND
QUASI-MOSAIC SHEET INDEX

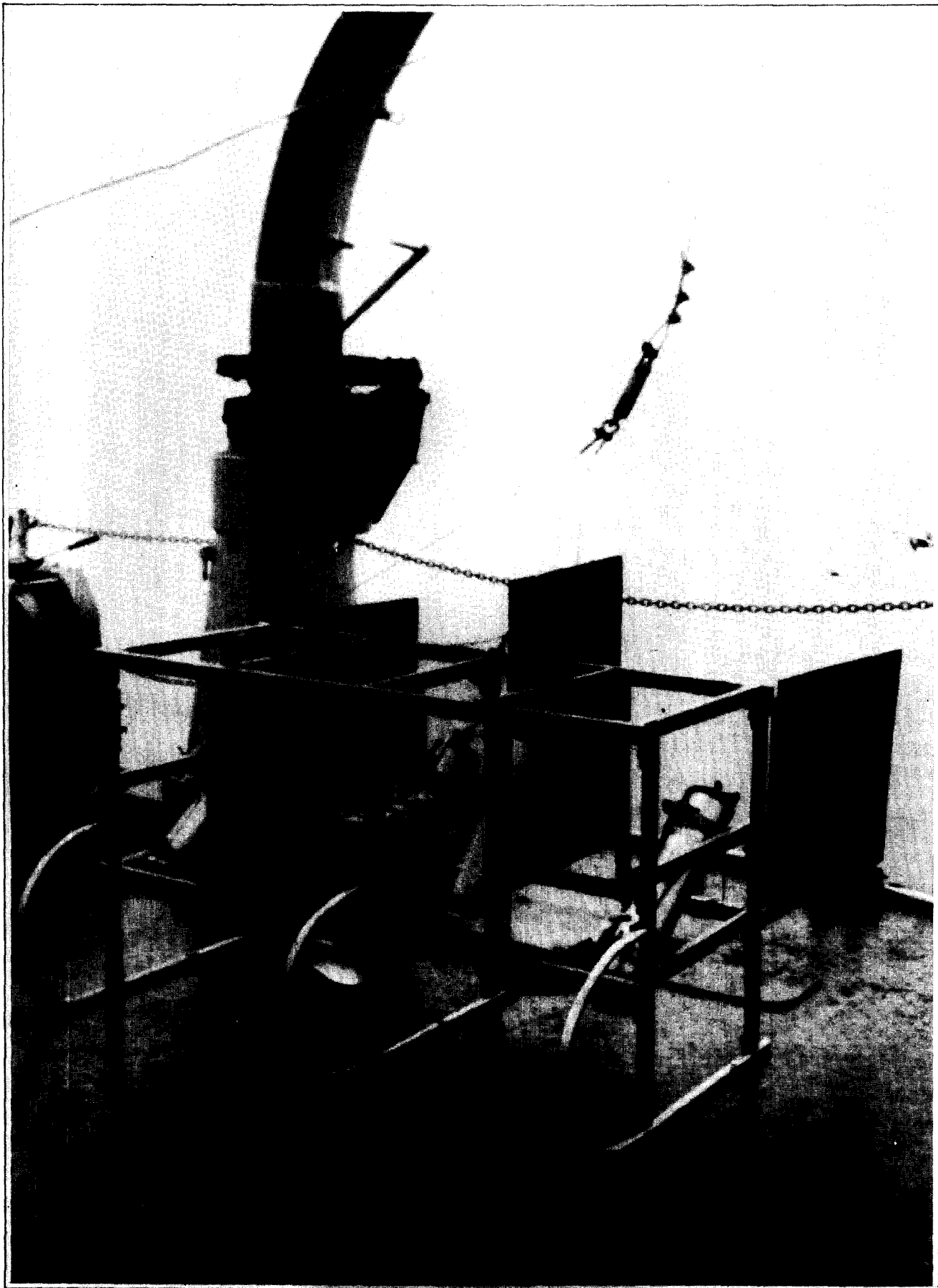


FIGURE 25 OBLIQUE CAMERA SYSTEM

VIII. REFERENCES

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5. OSER, R. and FAGOT, M.: "Design and Use of a Bottom Environmental Sensing System;" IR No. 67-74. U. S. Naval Oceanographic Office, Washington, D. C. 1967. 14 p.

APPENDIX A
BOTTOM SAMPLE LOG SHEETS

DATE 10 Oct 1967

DATE 10 OCT 1967

BS-4 Obtained in Nansen Bottle on Cast #5.

11. REMARKS

LOCATION: SEA LAB III, San Clemente IslandDATE LOGGED: 16 July 1967

	LAB NO.	COLOR	SEDIMENT TYPE	REMARKS
SAMPLE NO: 1 LAT: 32°59'39" LONG: 118°32'06" DATE: 5/7/67 WATER DEPTH: 88m	P4-1	light olive gray 5Y4/2	shelly sand	medium to coarse subangular sand. 80% calcareous, Forams, Globes, algae, Bryozoa, Pelecypods; 20% medium to coarse, subangular to angular to rounded quartz.
SAMPLE NO: 2 LAT: same LONG: position DATE: 5/7/67 WATER DEPTH: 88m	P4-2	lt olive gray to yellow gray. 5Y4/2-5Y7/2	shelly sand	fine to coarse subangular sand. 80-90% shells, Pelecypods, Bryozoa, Forams, algae. 10-20% quartz and feldspar. trace of silt, clay, and volcanics.
SAMPLE NO: 3 LAT: same LONG: position DATE: 5/7/67 WATER DEPTH: 88m	P4-3	lt yellowish gray 5Y7/2	shelly sand	medium to coarse, subangular sand. 80% calcareous Forams, Bryozoa, algae, Pelecypod fragments. 10% quartz xtals. 10% hornblend and volcanics.
SAMPLE NO: 4 LAT: 33°00'30" LONG: 118°31'48" DATE: 7/7/67 WATER DEPTH: 302m	P4-4	olive gray 5Y3/1	calcareous sand	medium to coarse sand, contains Forams, shell fragments, volcanic breccia material. pink stain.
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				

APPENDIX B
NANSEN CAST LISTINGS

REFERENCE		SHIP CODE	LATITUDE °	LONGITUDE ° ' 1/10	MARS DEN SQUARE	STATION TIME (GMT)			YEAR	ORIGINATOR'S		DEPTH TO BOTTOM	MAX. DEPTH OF S'PL'S	WAVE OBSERVATIONS			WEA- THER CODE	CLOUD CODES		NODC STATION NUMBER
CTRY CODE	ID. NO.					MO	DAY	HR. 1/10		CRUISE NO.	STATION NUMBER			DIR.	HGT	PER		SEA	TYPE	
311088	CD	32599N	118322W	120	28	07	07	084	1967	711	1	0135	01	00	0	X1	7	4	0002	

MESSAGE TIME HR 1/10	CAST NO.	CARD TYPE	DEPTH (m)	T °C	S ‰	SIGMA-T	SPECIFIC VOLUME ANOMALY- $\times 10^3$			$\Sigma \Delta D$ DYN. M. $\times 10^3$	SOUND VELOCITY	PO ₄ -P $\mu g - \text{at/l}$	TOTAL-P $\mu g - \text{at/l}$	NO ₂ -N $\mu g - \text{at/l}$	NO ₃ -N $\mu g - \text{at/l}$	SiO ₄ -Si $\mu g - \text{at/l}$	pH
							DRY BULB	WET BULB	VIS CODE								
084	STD	OBS	0000	1846	3343	2398	0039400	0000	0000	15160							
			0000	1846	3343	2398				15160							
084	STD	OBS	0010	1795	3340	2408	0038456	0039	0039	15146							
			0020	1712	3338	2426	0036735	0077	0077	15123							
084	STD	OBS	0020	1712	3338	2426	0033566	0112	0112	15077							
			0030	1559	3336	2460	0028490	0174	0174	14997							
084	STD	OBS	0045	1362	3335	2501	0024711	0240	0240	14933							
			0050	1302	3336	2514	0021379	0298	0298	14898							
084	STD	OBS	0070	1122	3338	2550				14938							
			0075	1103	3339	2554				14913							
084	STD	OBS	0090	1038	3348	2572				14913							
			0100	0988	3359	2589				14898							
084	STD	OBS	0100	0988	3359	2589				14898							
			0105	0964	3367	2599				14891							
084	STD	OBS	0110	0947	3372	2606				14886							
			0115	0941	3375	2609				14885							
084	STD	OBS	0120	0932	3376	2612				14883							
			0125	0924	3379	2615	0018937	0348	0348	14881							
084	STD	OBS	0125	0924	3379	2615				14881							
			0130	0902	3383	2622				14874							

REFERENCE SHIP CODE	ID. NO.	LATITUDE 1/10	LONGITUDE 1/10	MARS DEN SQUARE	STATION TIME (GMT)			YEAR	ORIGINATOR'S		DEPTH TO BOTTOM	MAX. DEPTH OF SAMPL'S	WAVE OBSERVATIONS	WEA- THER CODE	CLOUD CODES	NODC STATION NUMBER				
					MO	DAY	HR.		MIN.	CRUISE NO.							STATION NUMBER	TYPE	AMT	
311088	CD	32598N	118319W	120	28	07	07	097	1967	711	2	0177	02	00	0	X2	7	8	0003	
				WATER		WIND		BARO- METER		AIR TEMP. °C		VIS.		SPECIAL OBSERVATIONS						
				COLOR CODE		SPEED OR FORCE		(mbars)		DRY BULB		WET BULB		NO. OBS. DEPTHS						
						00		500		15		167		158		7				

MESSENGER TIME HR 1/10	CAST NO.	CARD TYPE	DEPTH (m)	T °C	S %	SIGMA-T	SPECIFIC VOLUME ANOMALY-20°	Σ Δ D DYN. M. x 10³	SOUND VELOCITY	O₂ ml/l	PO₄-P μg-at/l	TOTAL-P μg-at/l	NO₂-N μg-at/l	NO₃-N μg-at/l	SiO₄-Si μg-at/l	pH
097		OBS	0124		3376											
		STD	0125		3377											
097		OBS	0129	0920	3379	2616			14880							
097		OBS	0134	0896	3386	2625			14873							
097		OBS	0139	0892	3386	2626			14872							
097		OBS	0144	0890	3387	2627			14872							
097		OBS	0149	0882	3389	2630			14870							
		STD	0150	0882	3389	2630	0017584		14870							
097		OBS	0154	0879	3390	2631			14870							
097		OBS	T0159	0864	3391	2634			14865							
097		OBS	0163	0858	3393	2637			14864							
097		OBS	0168	0858	3393	2637			14865							
097		OBS	0173	0859	3394	2637			14866							
097		OBS	T0178	0842	3394	2640			14860							

[illegible]

REFERENCE		SHIP CODE	LATITUDE ° 1/10	LONGITUDE ° 1/10	MARSden SQUARE		STATION TIME (GMT)			YEAR	ORIGINATOR'S		DEPTH TO BOTTOM	MAX. DEPTH OF S'PL'S	WAVE OBSERVATIONS			WEA- THER CODE	CLOUD CODES		NODC STATION NUMBER
CTRY CODE	ID. NO.				10°	1'	MO	DAY	HR./10		CRUISE NO.	STATION NUMBER			DIR.	HGT PER	SEA		TYPE	AMT	
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MESSAGE TIME HR 1/10	CAST NO.	CARD TYPE	DEPTH (m)	T °C	S ‰	SIGMA-T	SPECIFIC VOLUME ANOMALY-20°	Σ Δ D DYN. M. X 10 ³	SOUND VELOCITY	PO ₄ -P μg - at/l	NO ₂ -N μg - at/l	NO ₃ -N μg - at/l	SiO ₄ -Si μg - at/l	pH	C
122		OBS	0097	0986	3363	2593			14897						
		STD	0100	0977	3365	2596	0020759		14894						
122		OBS	0117	0938	3373	2608			14884						
		STD	0125	0928	3376	2612	0019221		14882						
122		OBS	0132	0918	3378	2616			14880						
		STD	0150	0889	3385	2626	0018001		14873						
122		OBS	0167	0866	3391	2634			14867						
122		OBS	0187	0844	3397	2642			14863						
122		OBS	0197	0834	3397	2644			14861						
		STD	0200	0833	3398	2644	0016323		14861						
122		OBS	0202	0833	3398	2644			14862						
122		OBS	0207	0832	3398	2645			14862						
122		OBS	T0212	0822	3398	2646			14859						
122		OBS	0217	0814	3401	2650			14857						
122		OBS	0222	0808	3402	2651			14856						
122		OBS	T0227	0797	3403	2654			14853						

REFERENCE	SHIP CODE	LATITUDE	LONGITUDE	MARS DEN SQUARE	STATION TIME (GMT)			YEAR	ORIGINATOR'S		DEPTH TO BOTTOM	MAX. DEPTH OF	WAVE OBSERVATIONS		WEATHER CODE	CLOUD CODES		NODC STATION NUMBER											
					MO	DAY	HR:1/10		CRUISE NO.	STATION NUMBER			DIR	HGT PER SEA		TYPE	AMT												
311088	CD	33005N	118318W	120 38	07 07	137	1967	711	5		0302	04	11	0	X2	7	8	0006											
				WATER		WIND		BARO-METER (mbs)		AIR TEMP. °C		SPECIAL OBSERVATIONS																	
				COLOR CODE	TRANS. (m)	DIR.	SPEED OR FORCE	WET BULB	DRY BULB	VIS. CODE	NO. OBS. DEPTHS																		
												11	S02	145	164	156	8												
MESSAGE CAST TIME OF NO. HR 1/10				T °C		S ‰		SIGMA-T		SPECIFIC VOLUME ANOMALY-σ _t 10 ³		Σ Δ D DYN. M. x 10 ³		SOUND VELOCITY		O ₂ ml/l		PO ₄ -P μg - at/l		TOTAL-P μg - at/l		NO ₂ -N μg - at/l		NO ₃ -N μg - at/l		SiO ₄ -Si μg - at/l		pH	
137				OBS		1115		3338		2551				14934															
				STD		1060		3350		2570		0023173		14919															
137				OBS		0983		3367		2596		0020707		14897															
				OBS		0958		3372		2604				14890															
				STD		0931		3377		2613		0019194		14883															
137				OBS		0891		3385		2625		0018032		14873															
				STD		0876		3388		2630				14870															
137				OBS		0824		3396		2644		0016303		14858															
				STD		0813		3398		2647				14855															
137				OBS		0778		3405		2658		0015052		14849															
				OBS		0770		3406		2660				14848															
				STD		0741		3409		2667		0014311		14844															
137				OBS		0730		3410		2669				14841															
137				OBS		0703		3413		2675				14834															
137				OBS		T0340		3414		2677				14832															
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137				OBS		0686		3414		2678				14830															
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137				OBS		0682		3414		2679				14830															
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Security Classification

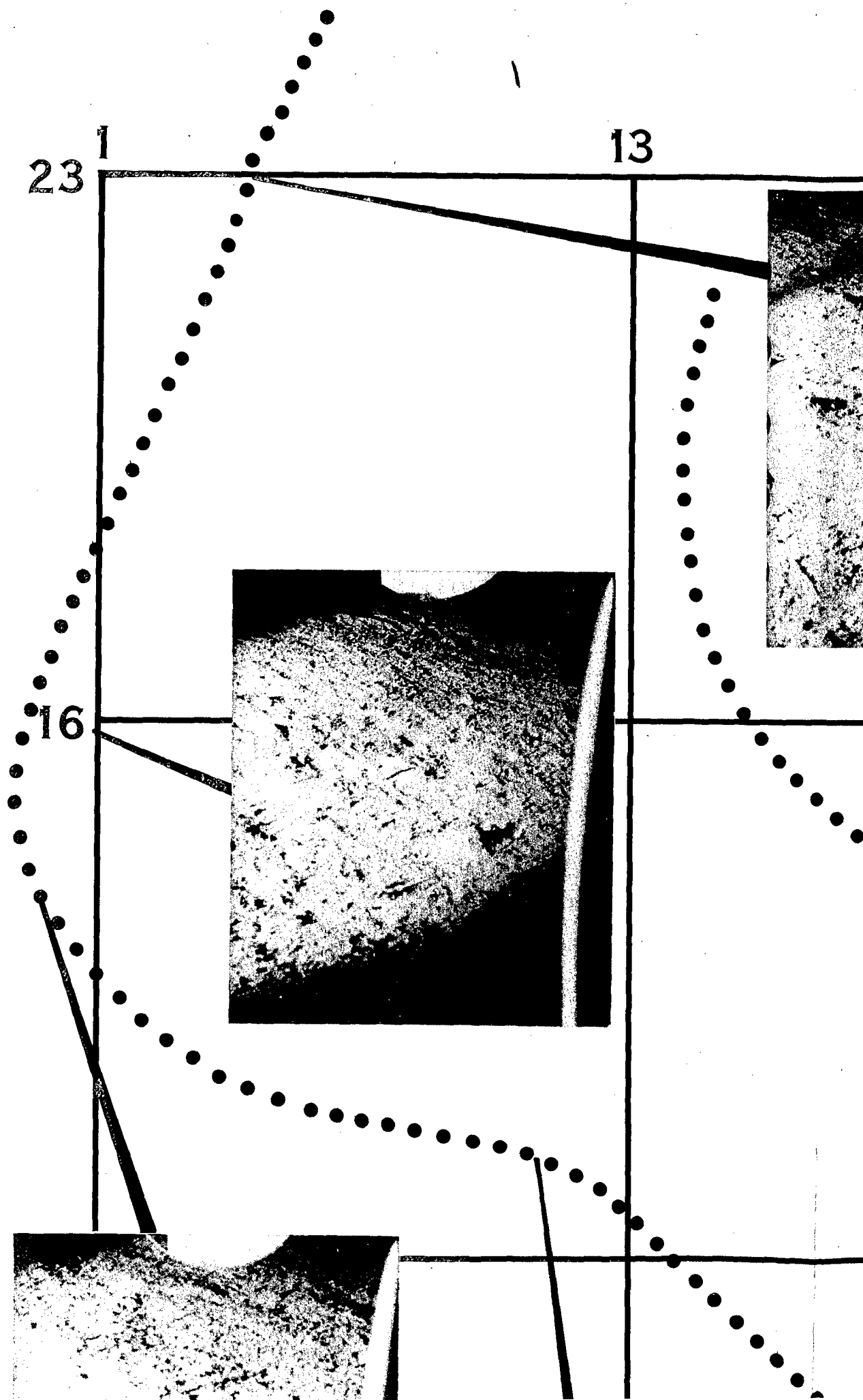
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This report is a supplement to I.R.67-77		U.S. Naval Oceanographic Office	
13. ABSTRACT			
<p>This report presents oceanographic data collected during July and August 1967 aboard the USNS DAVIS (T-AGOR 5) in the San Clemente Island Deep Submergence Rescue Vehicle Test Range and SEA LAB III areas. The Deep-Towed Profiler records show two small valleys in the SEA LAB III area. The bottom's surface was predominately sand at the sites sampled. Nansen cast data show that the water column temperature decreases almost linearly below the thermocline. Although current speeds of 0.5 knots were recorded at the 100 and 260 fathom sites, the predominant current speeds varied from 0.0 to 0.2 knots. The near-bottom current at the 42 fathom site reached 0.7 knots with a mean speed of 0.5 knots. The current direction at the sites sampled reverses along an axis parallel to San Clemente Island. Bottom photographs show that the bottom is alternately smooth and flat, steep, and boulder strewn.</p>			

Security Classification

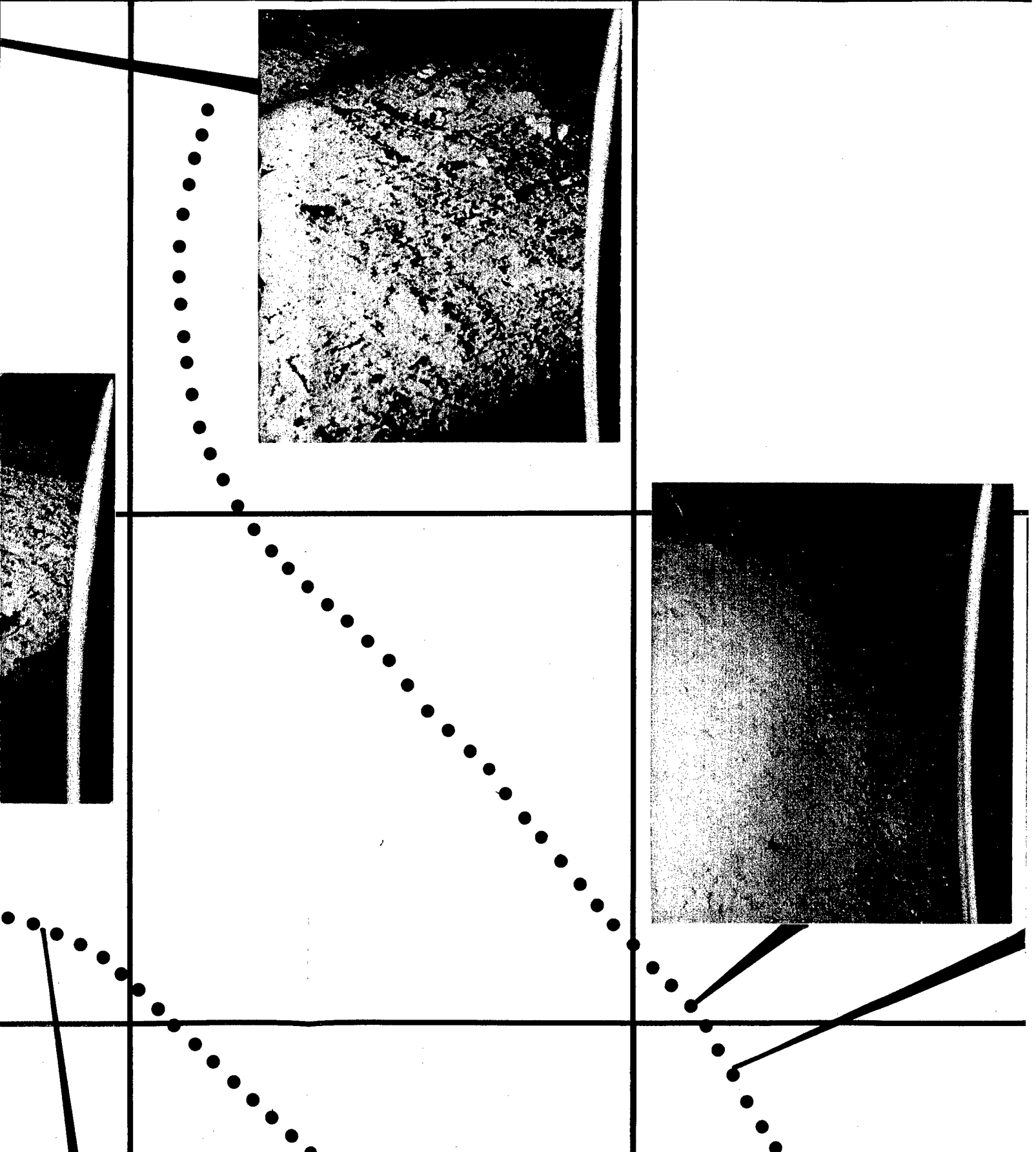
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San Clemente Island Area						
Sea Lab III Area Oceanography						
DSRV Test Area Oceanography						



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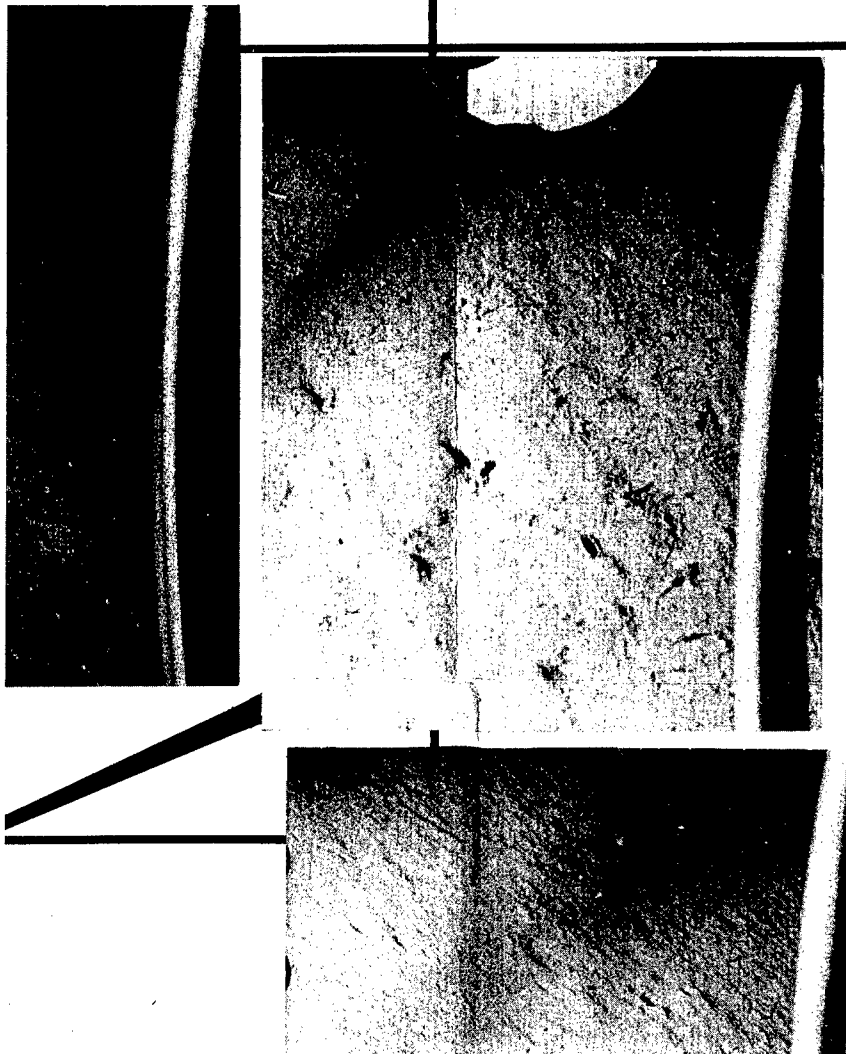
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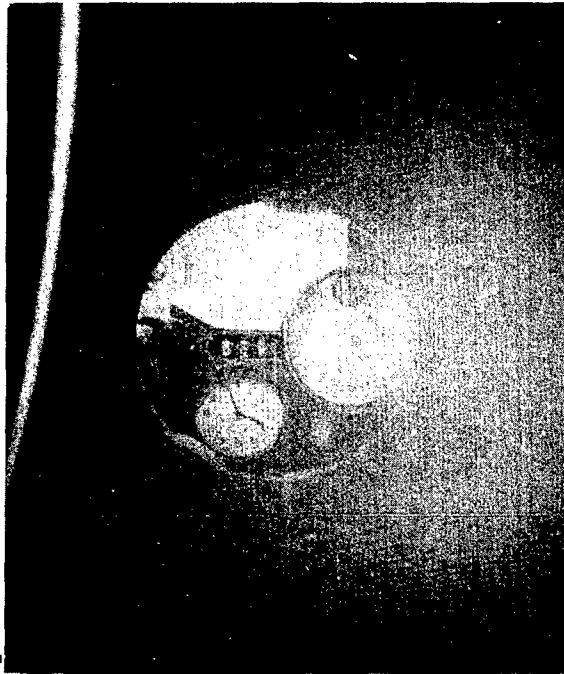
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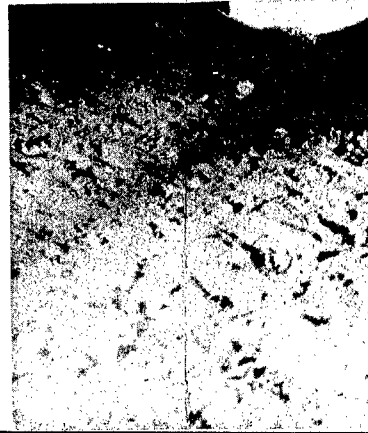
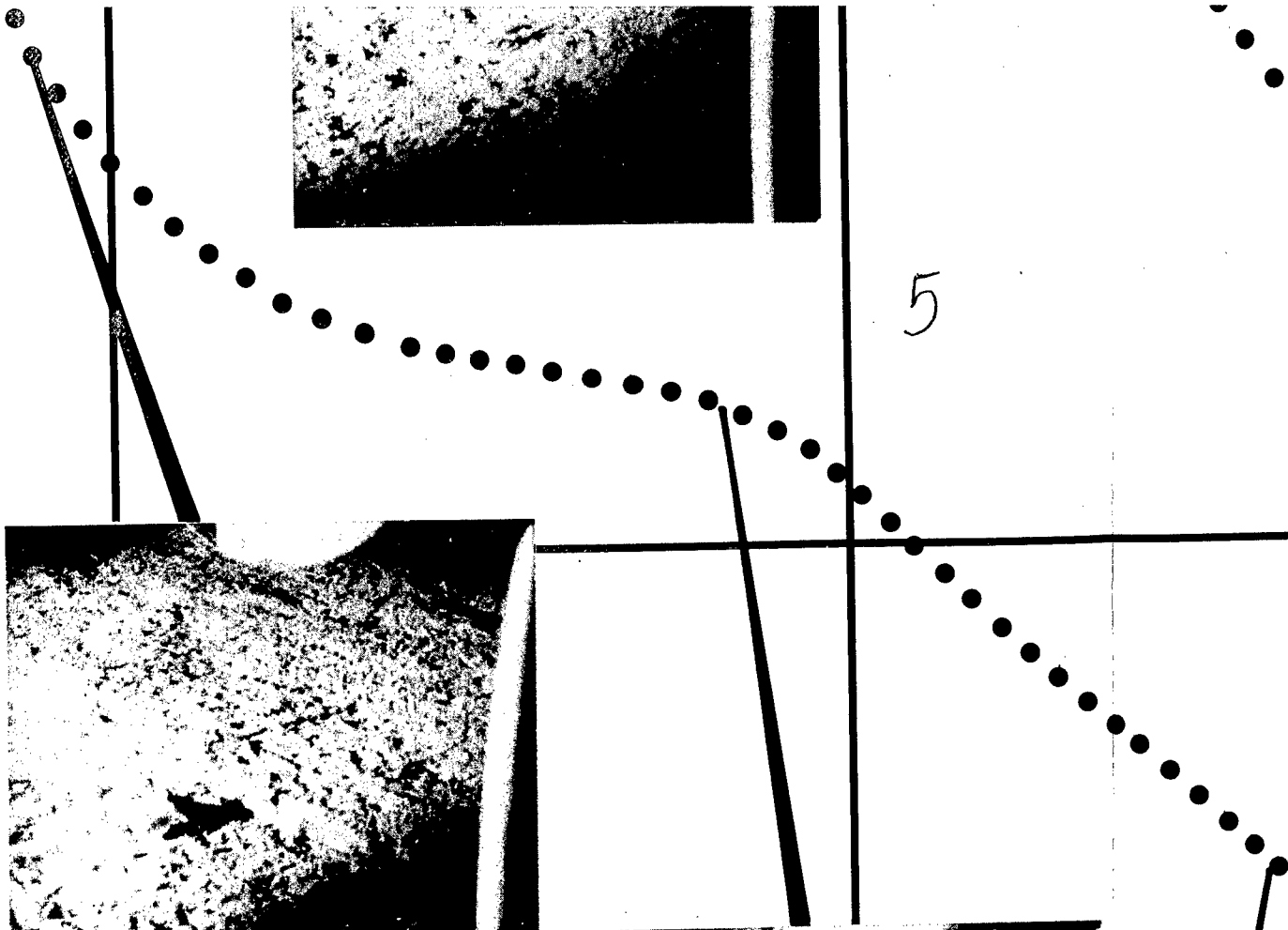


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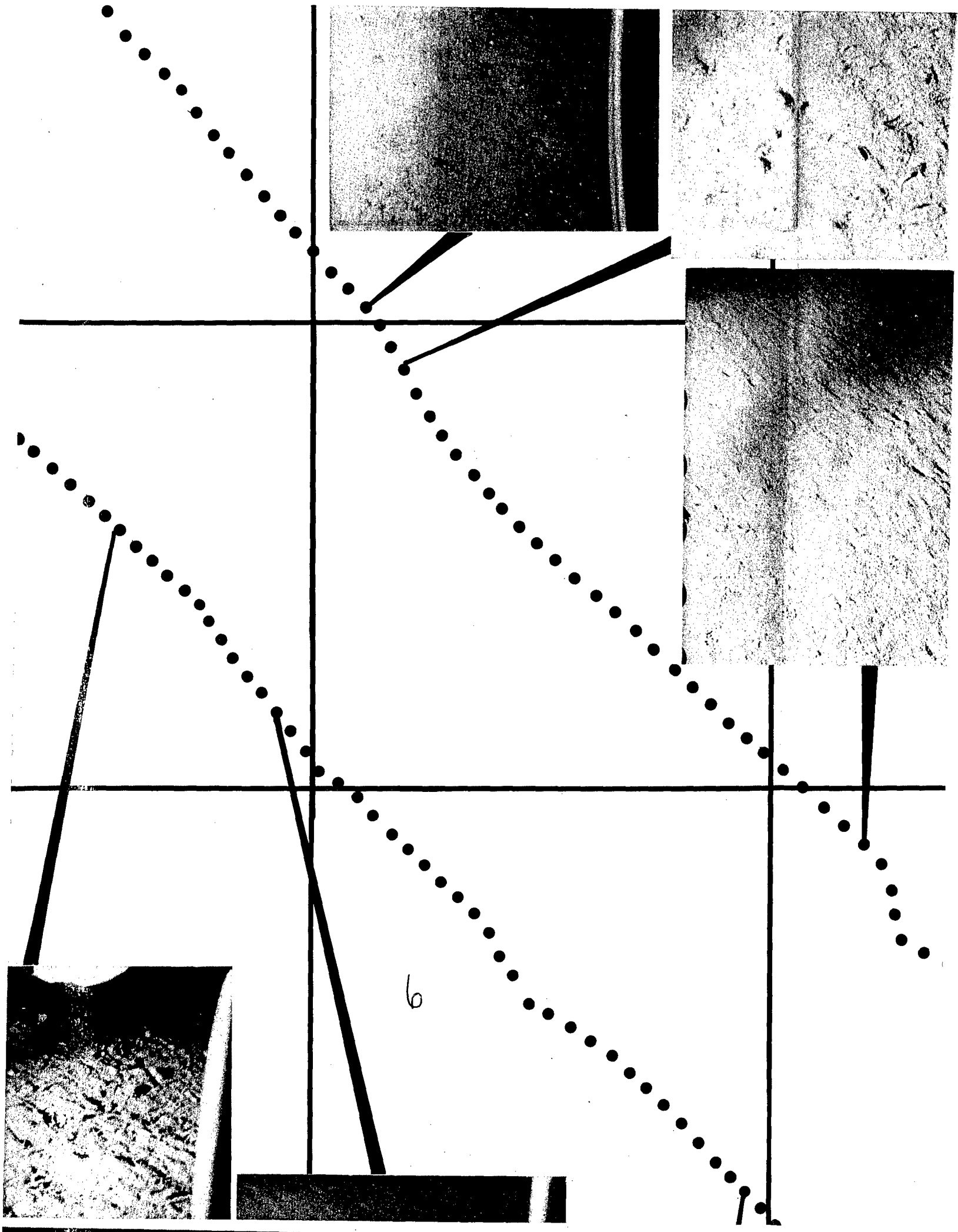


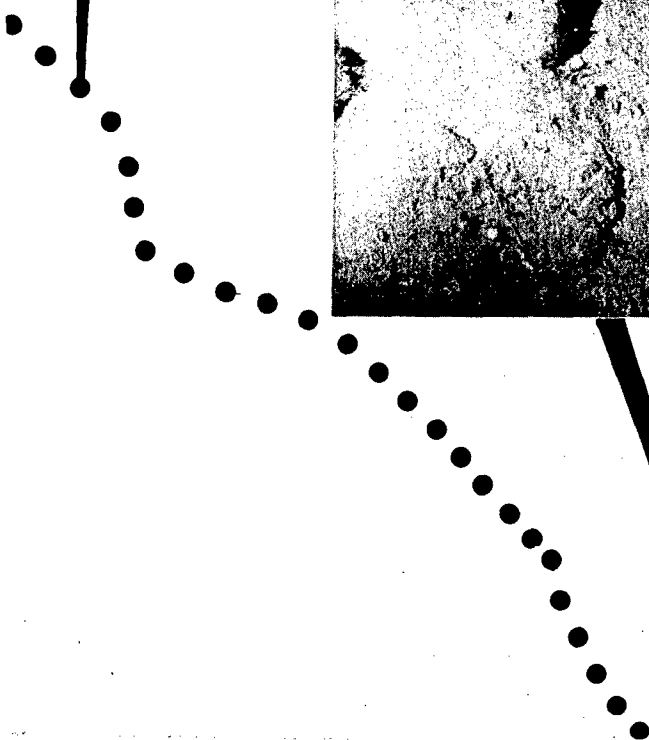
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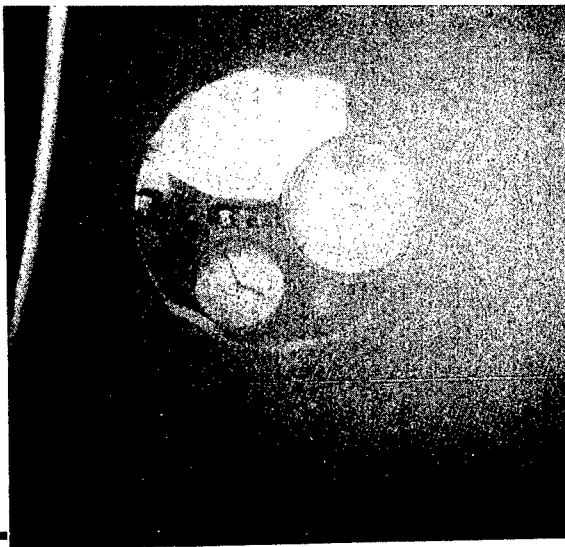


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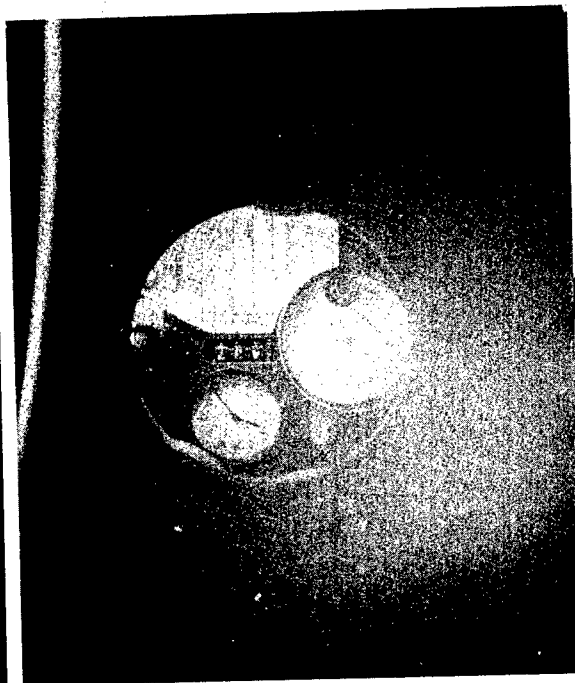




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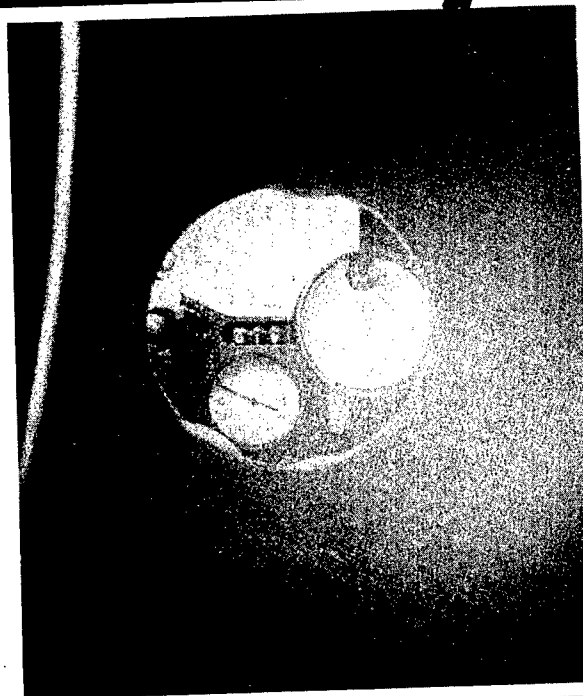


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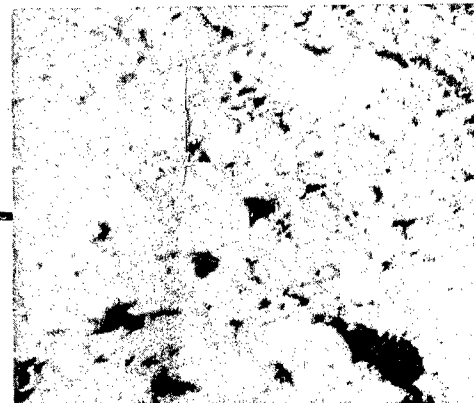


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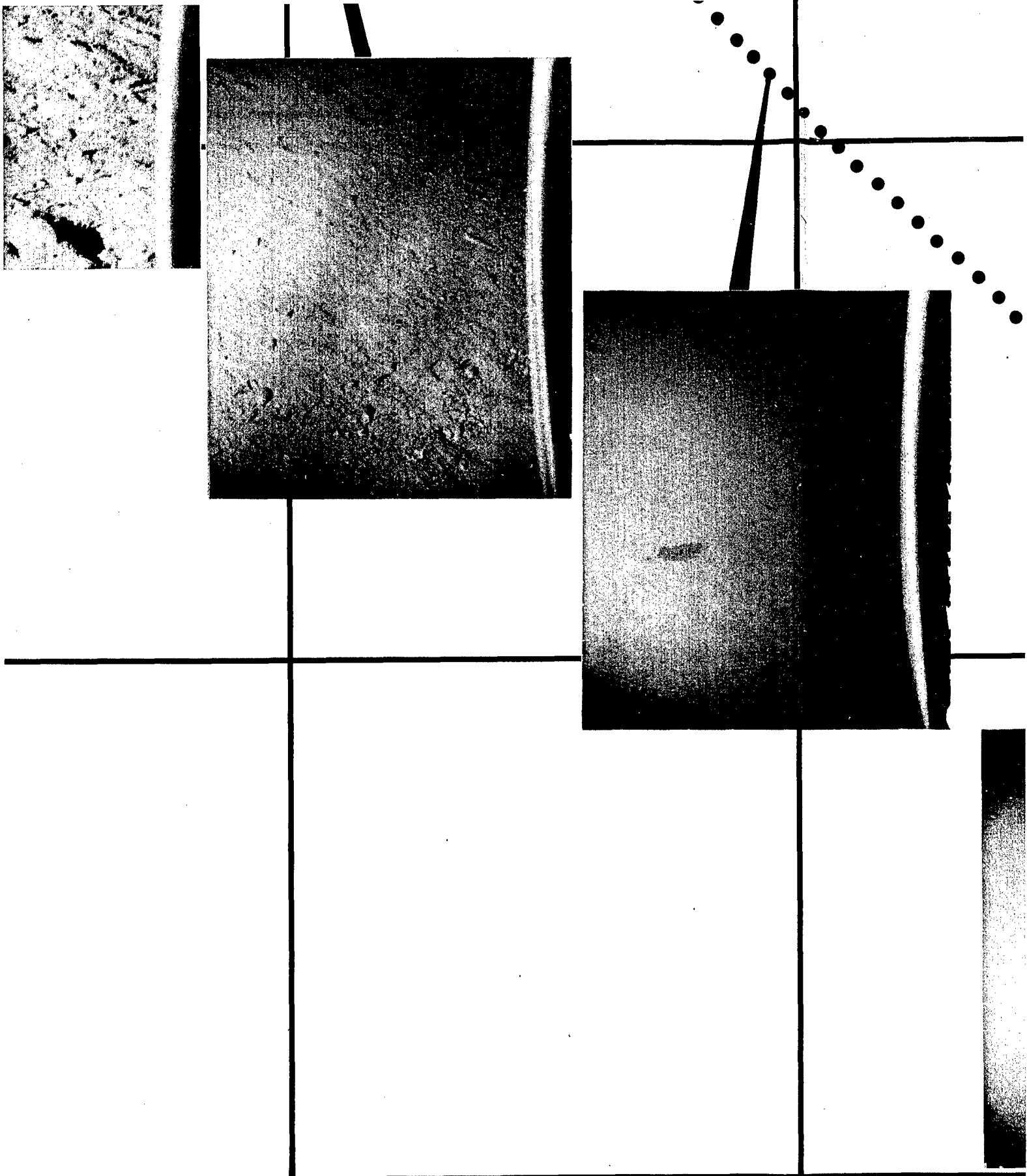
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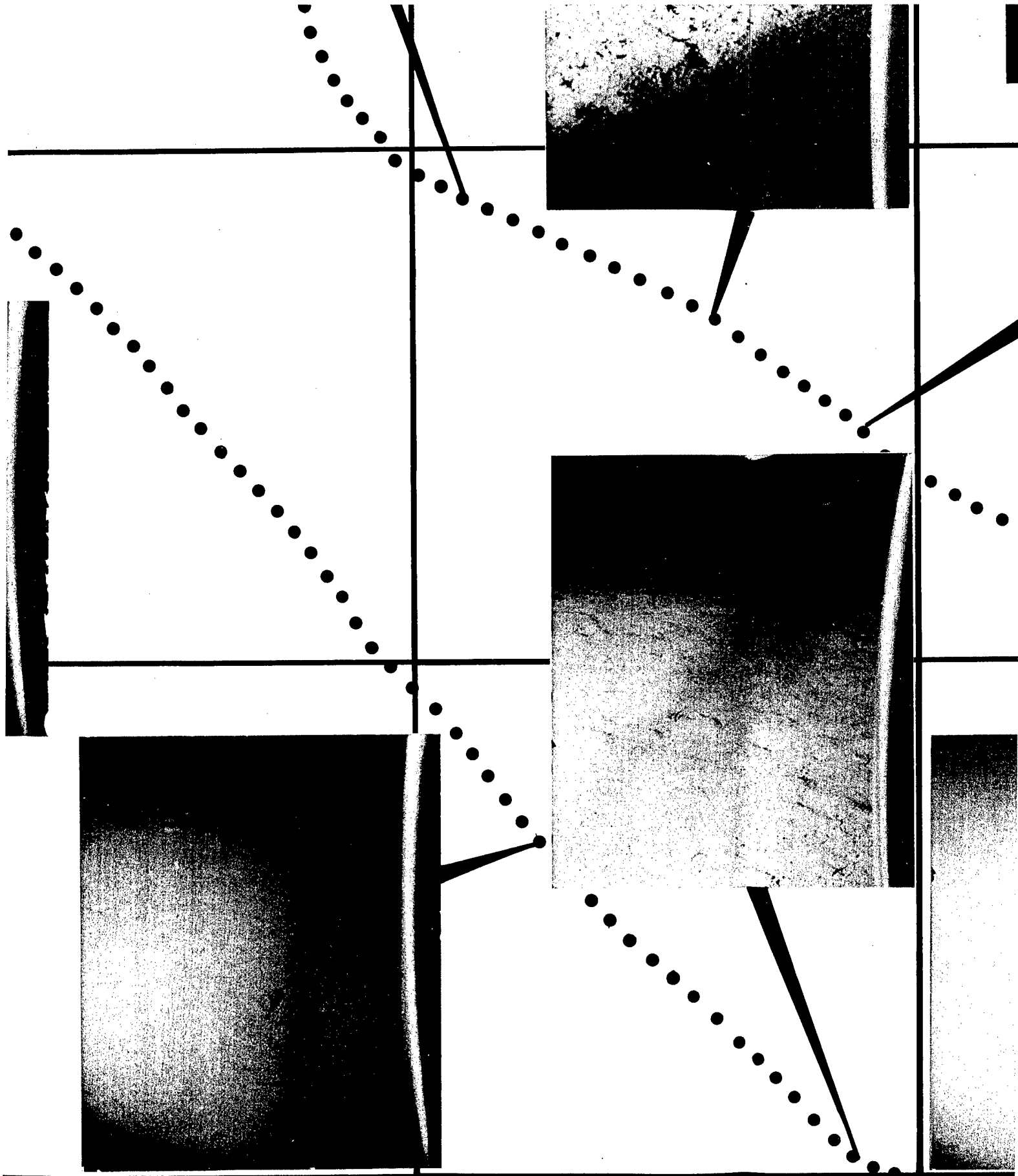
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FIGURE 28 SEA LAB III SEA FLOOR



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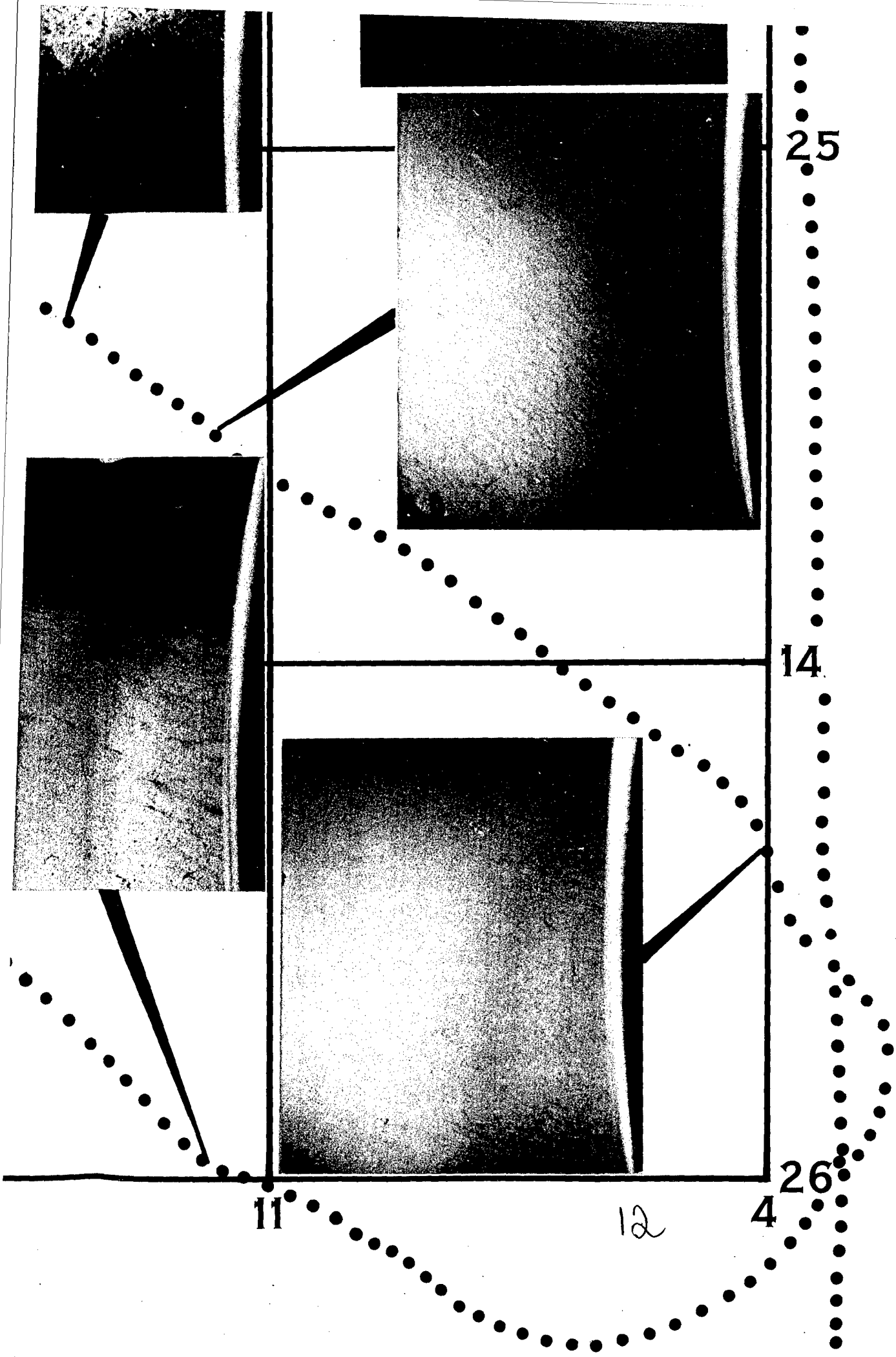
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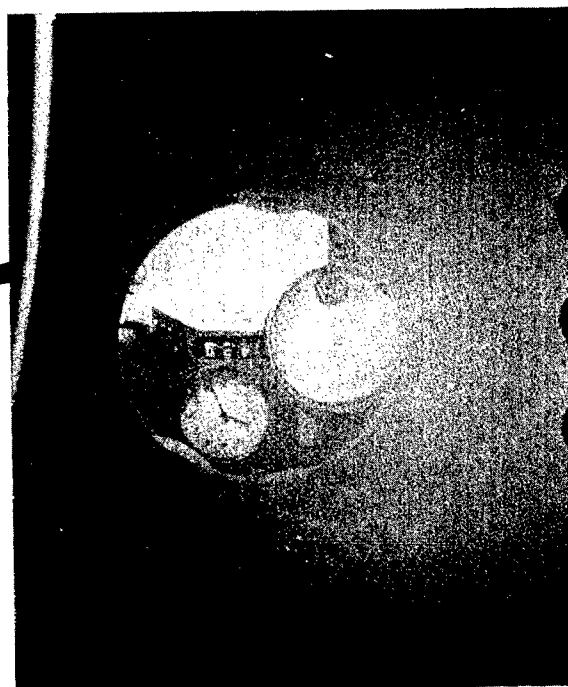


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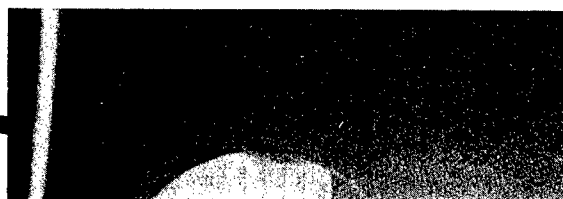
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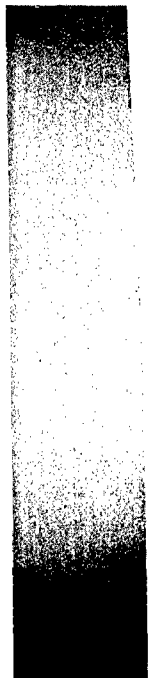
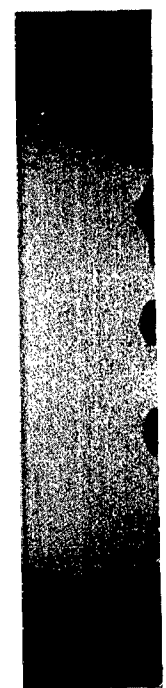

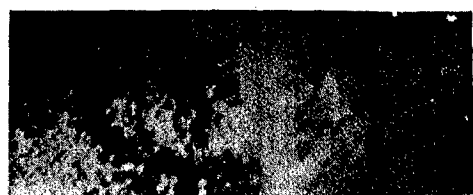
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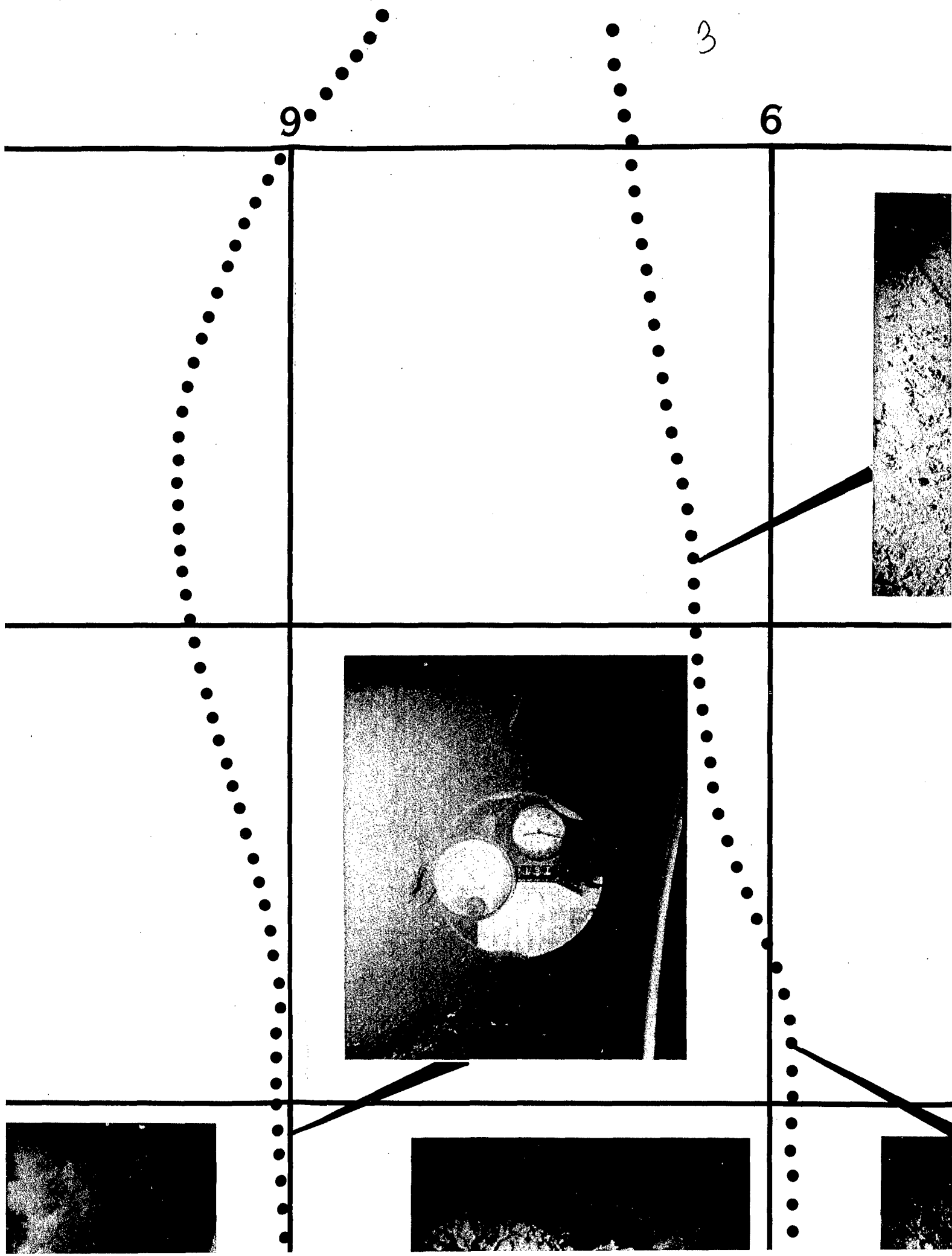


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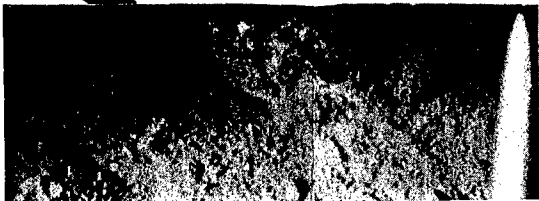
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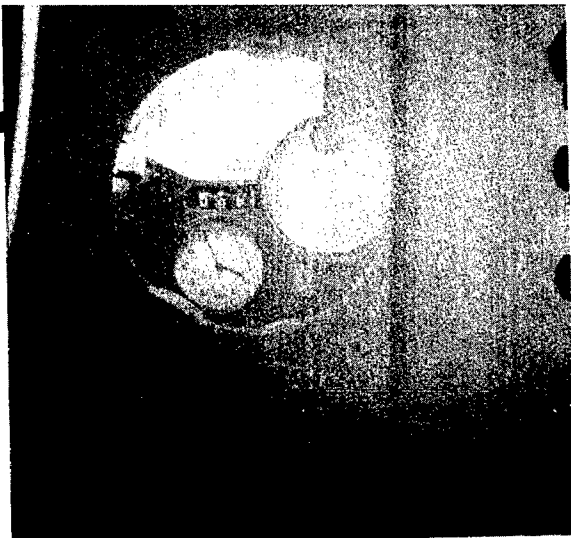


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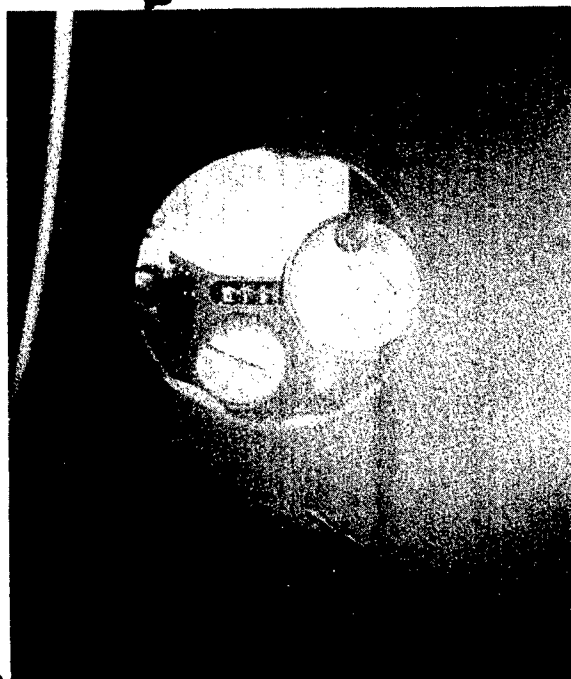
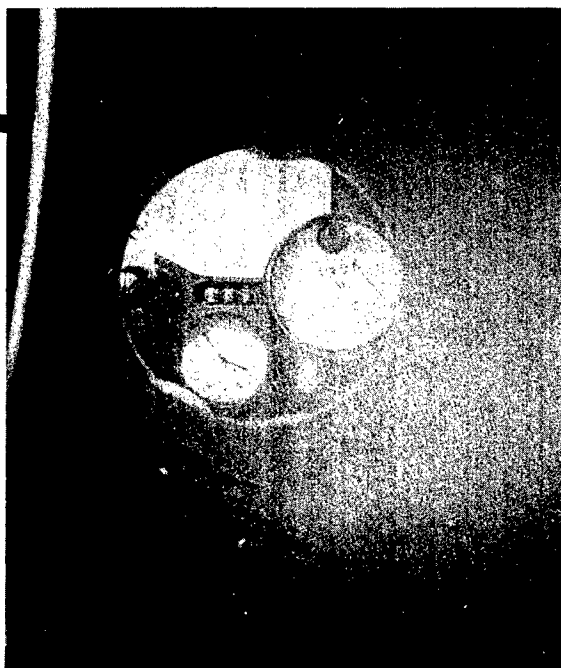


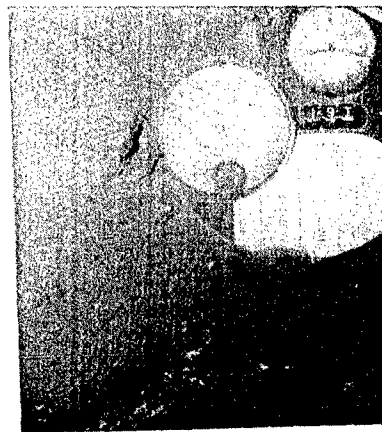
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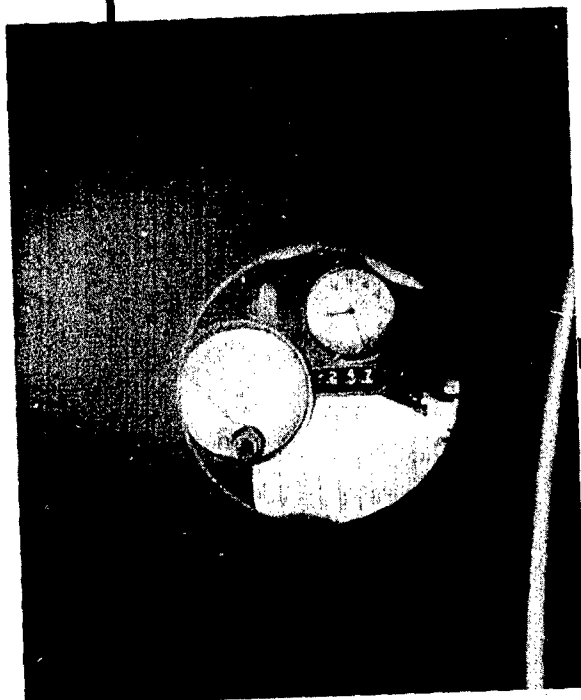
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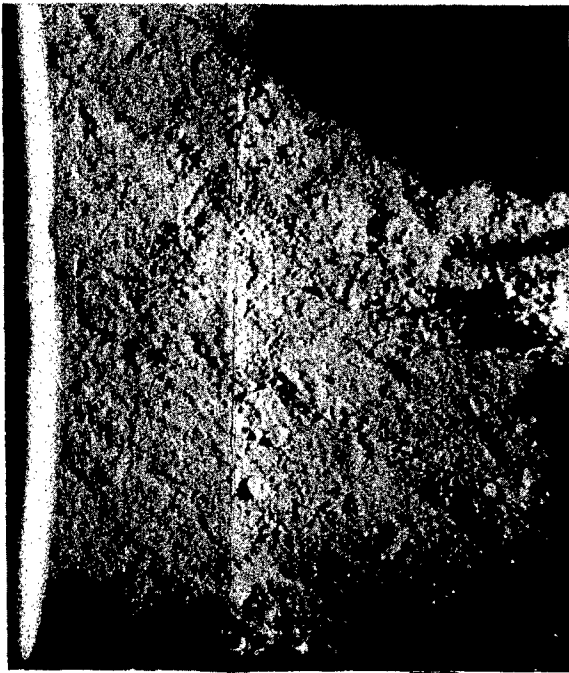


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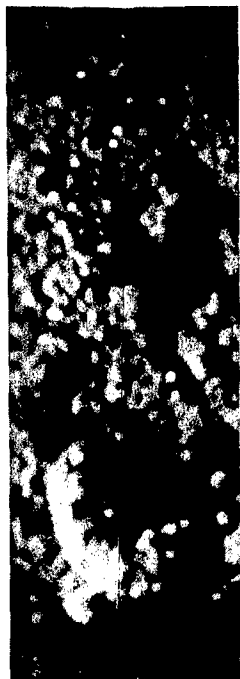


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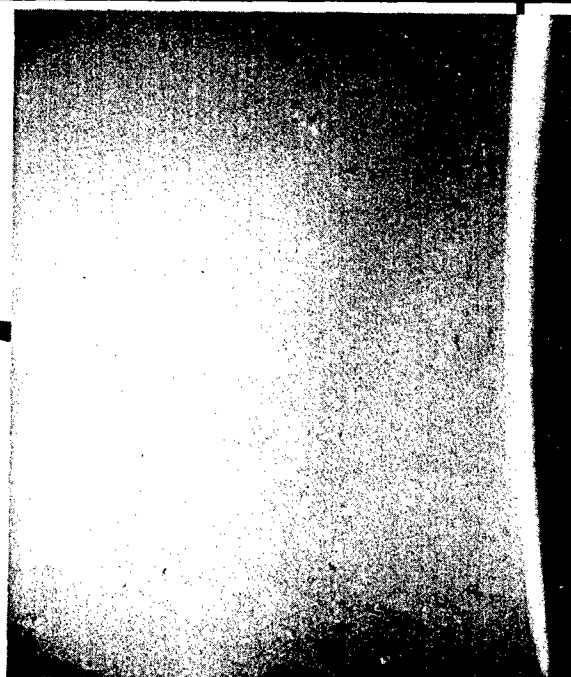


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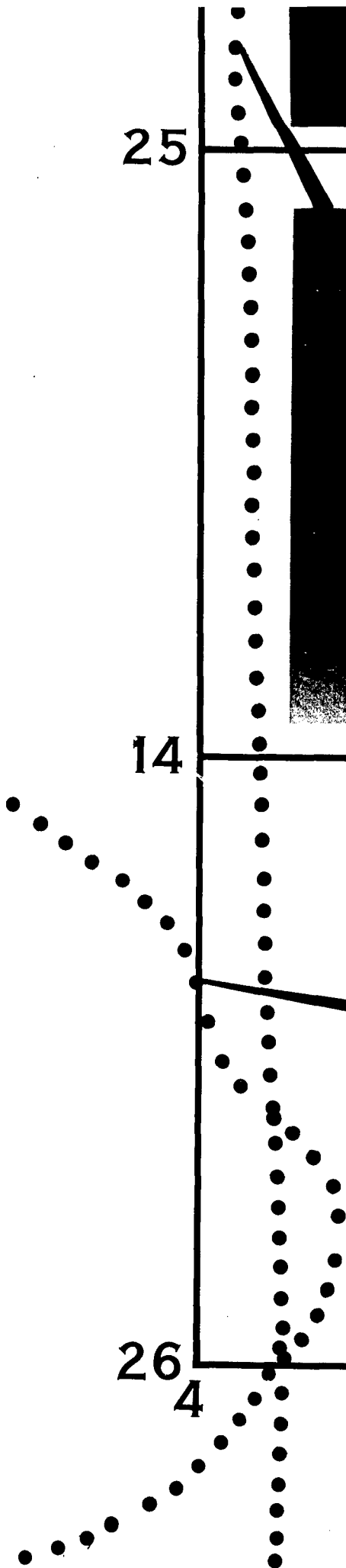
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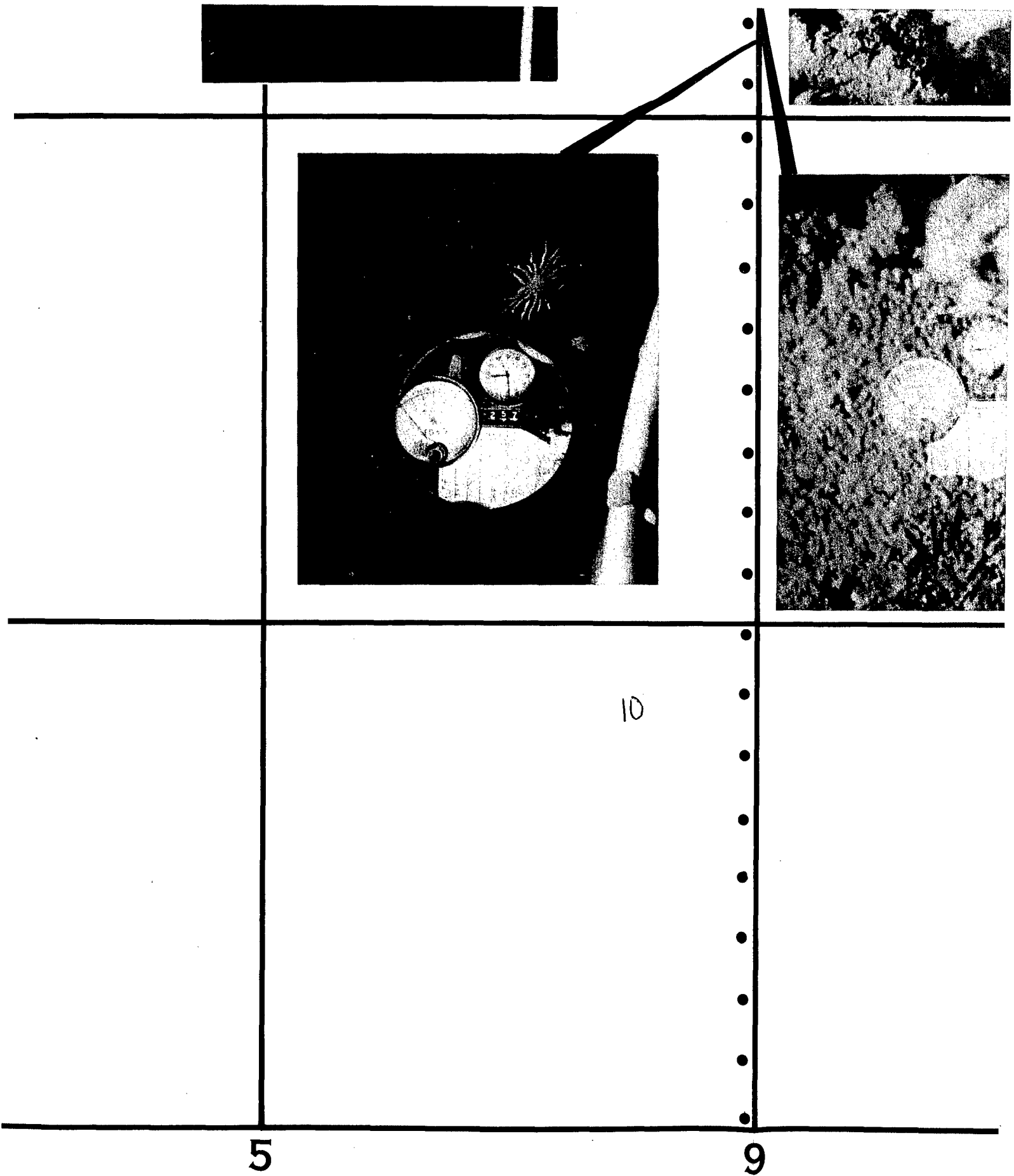
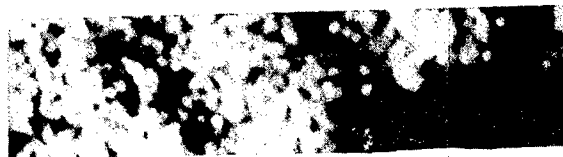
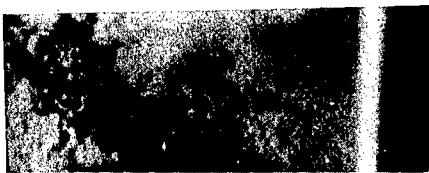


FIGURE 29 SEA LAB III SEA FLOOR G

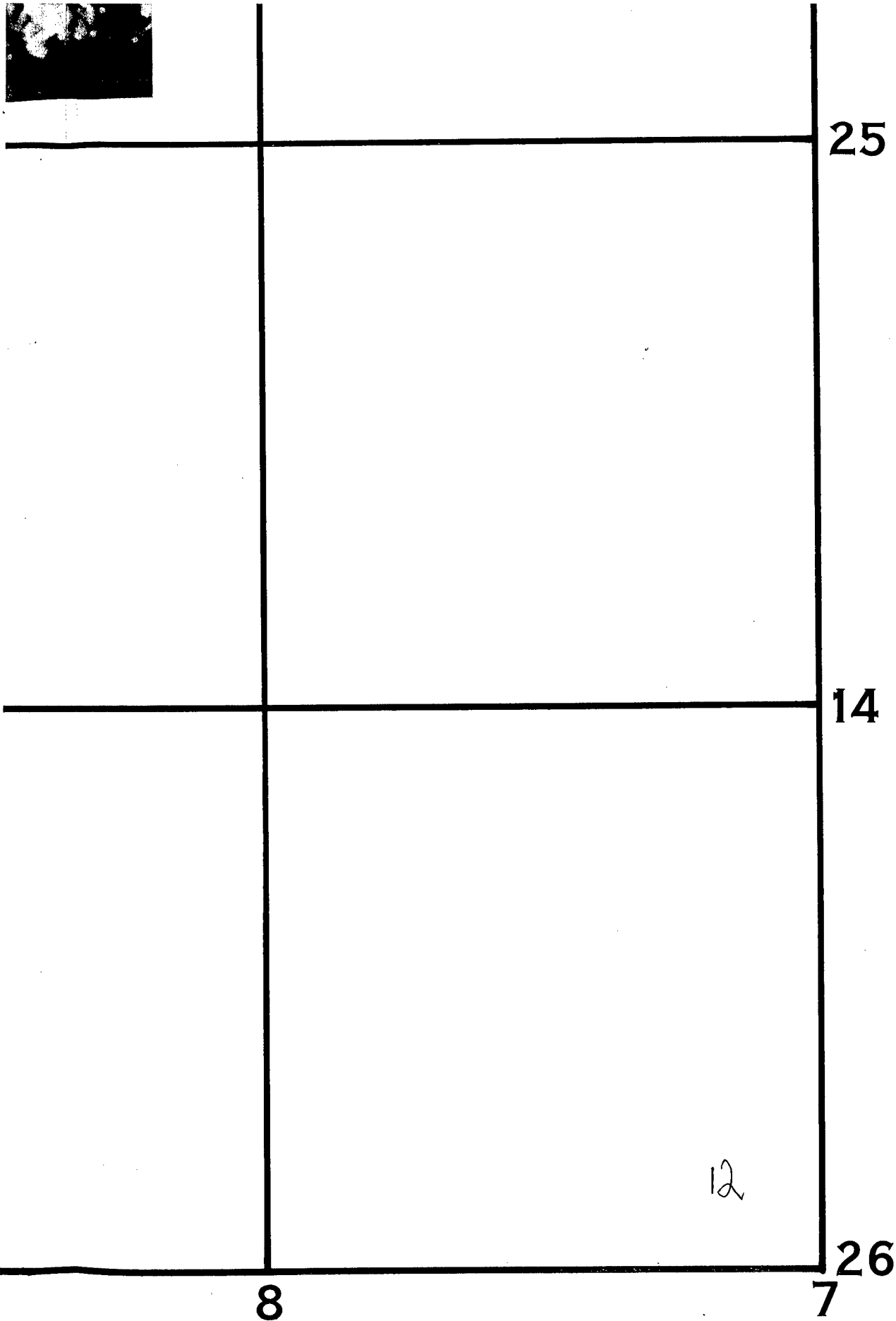


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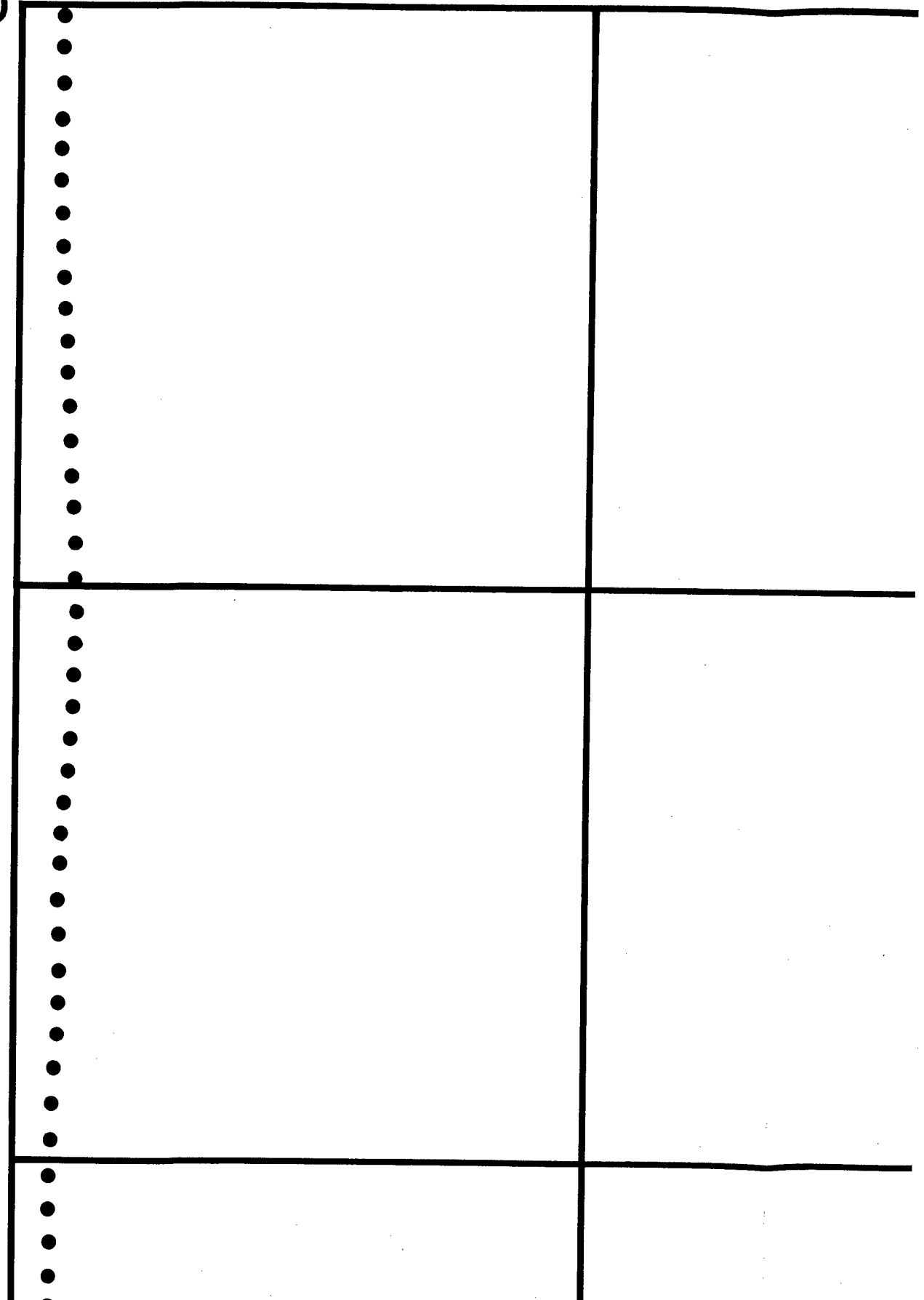


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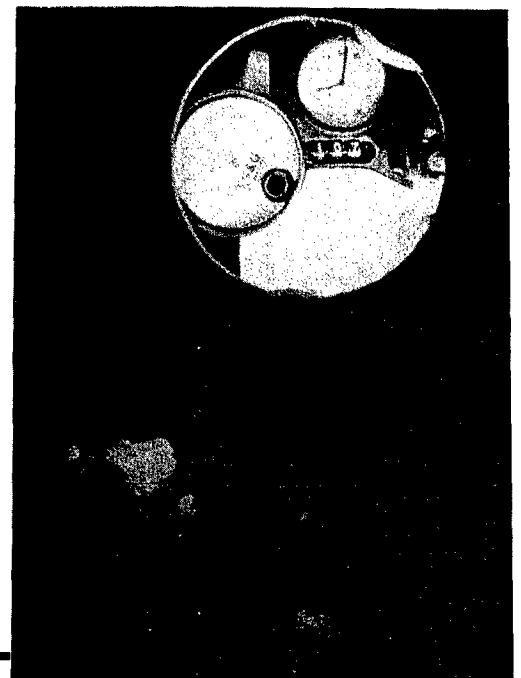
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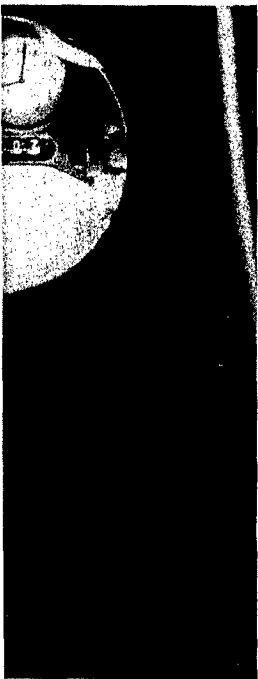
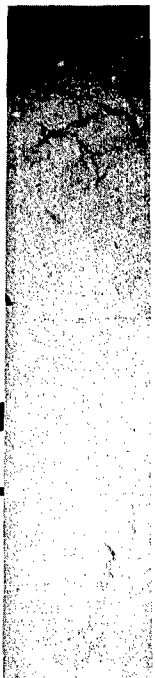
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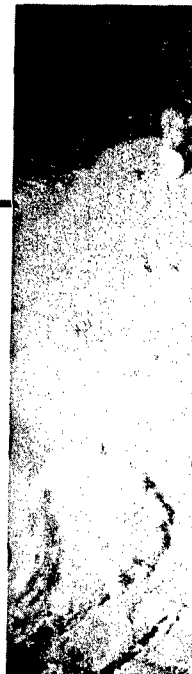
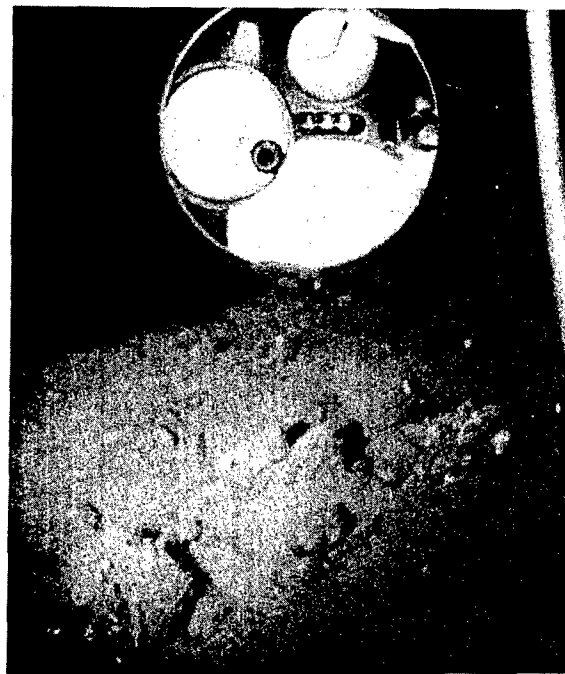
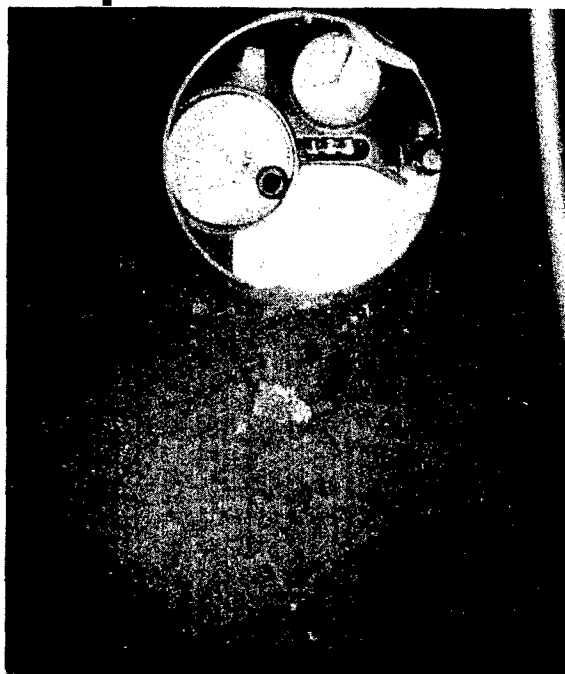
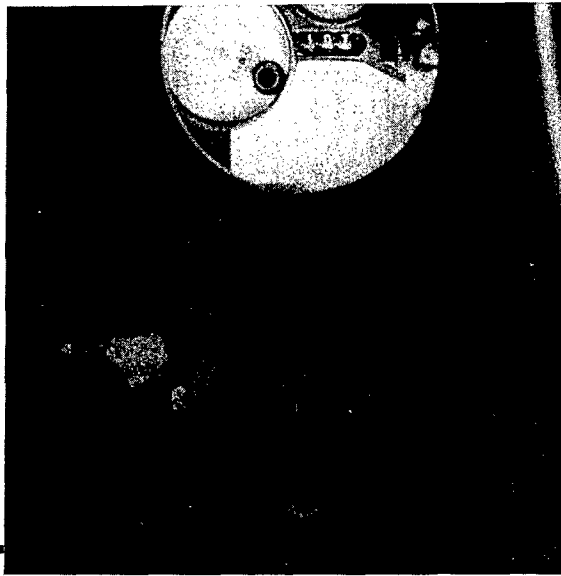
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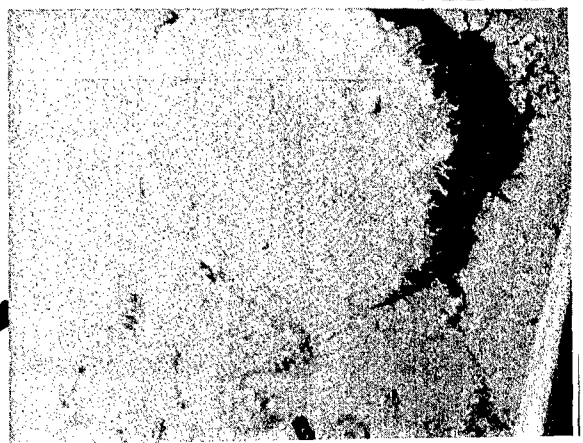
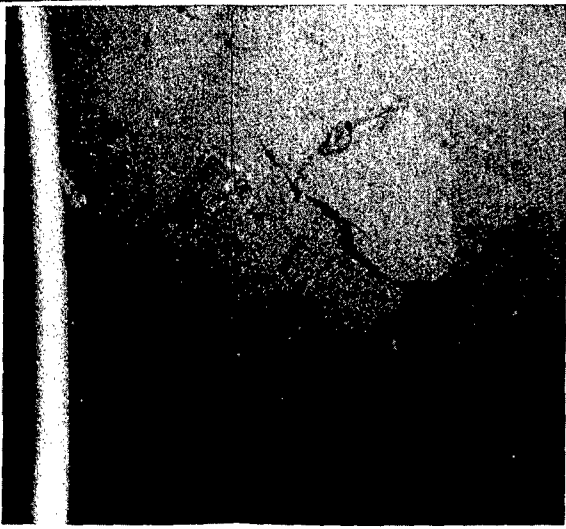
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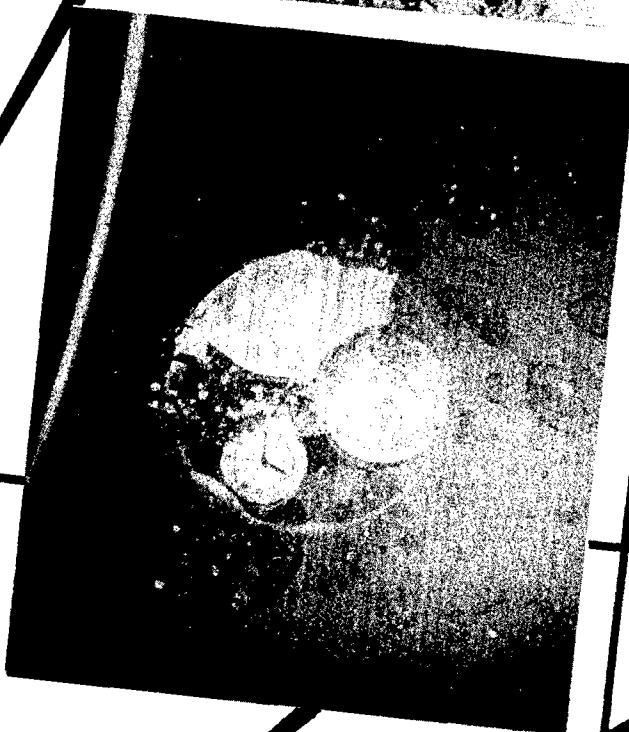
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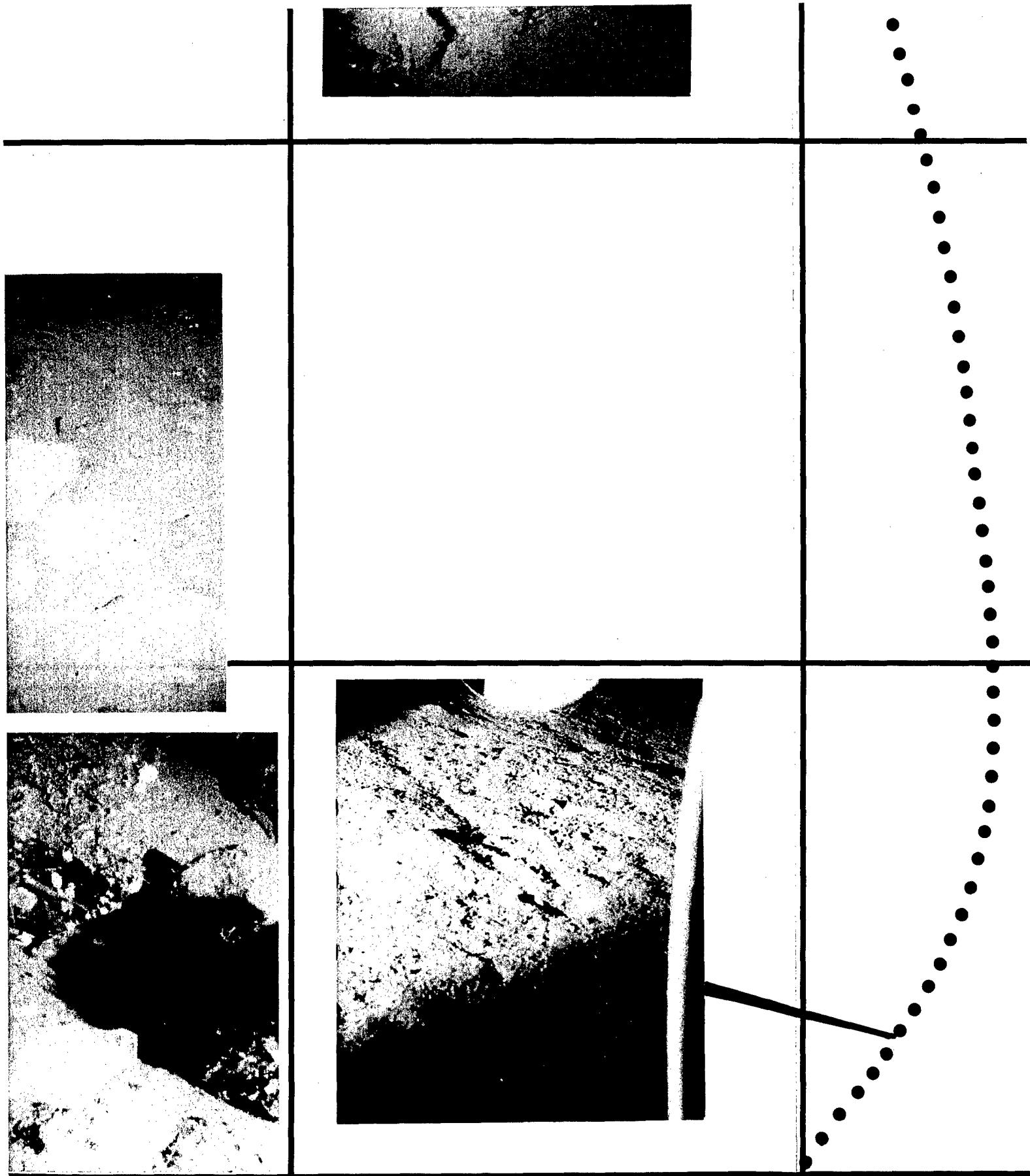
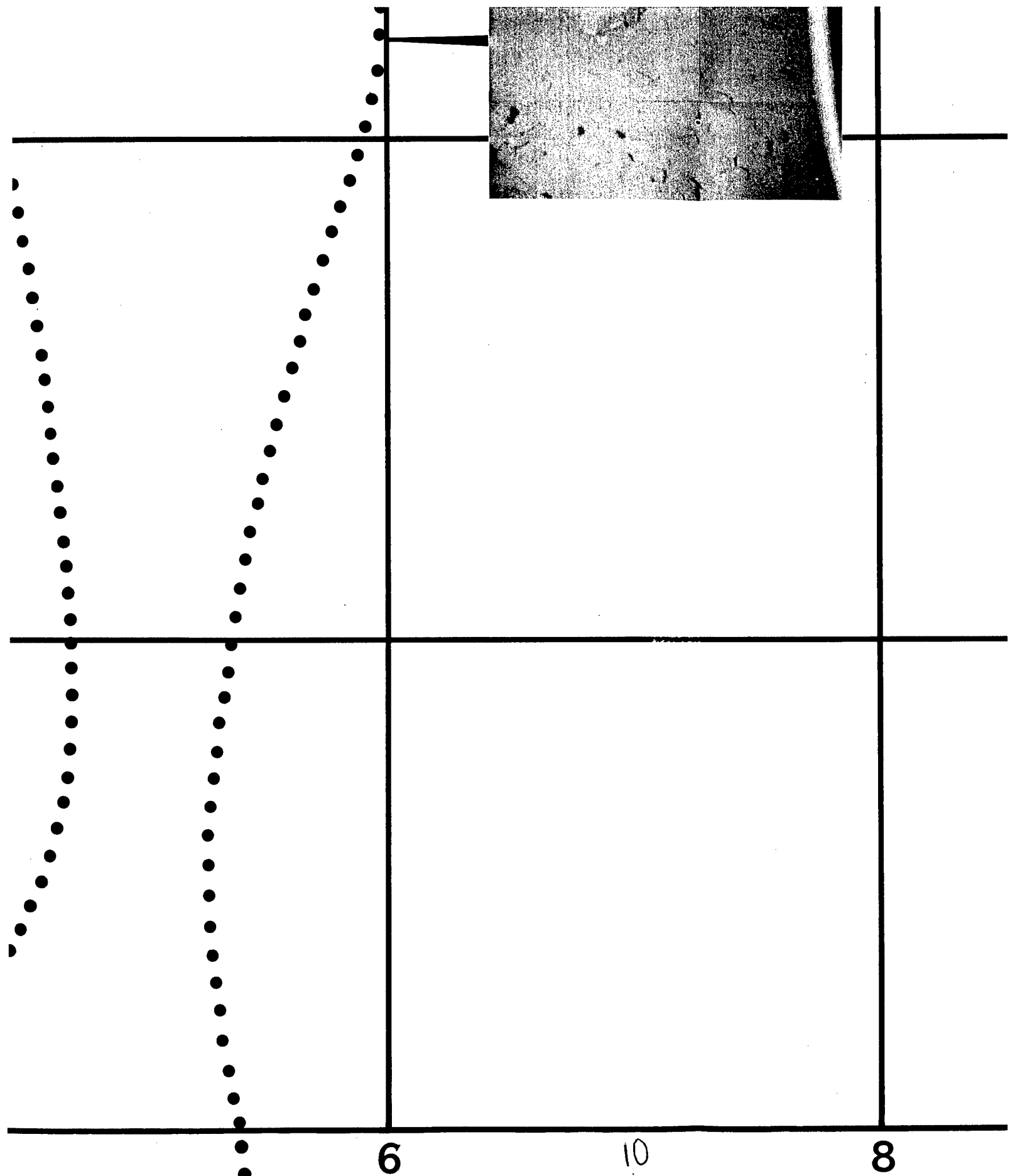
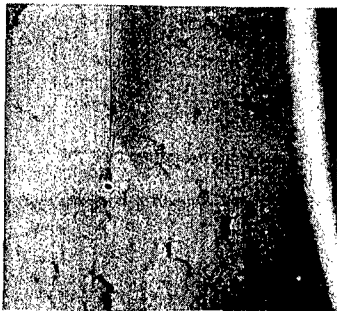


FIGURE 27 SEA LAB III SEA FLOOR QUA



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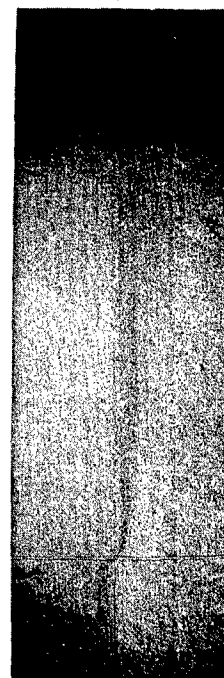
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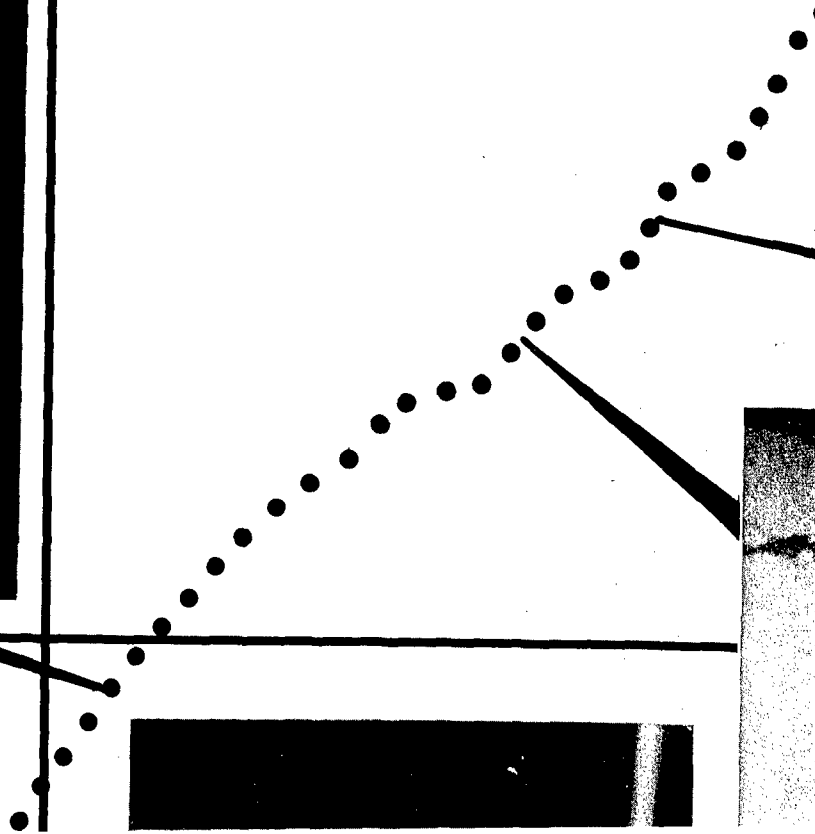
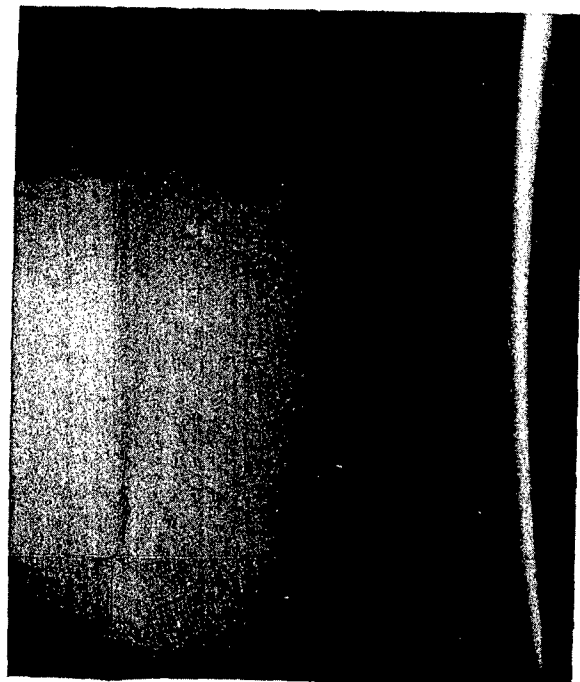
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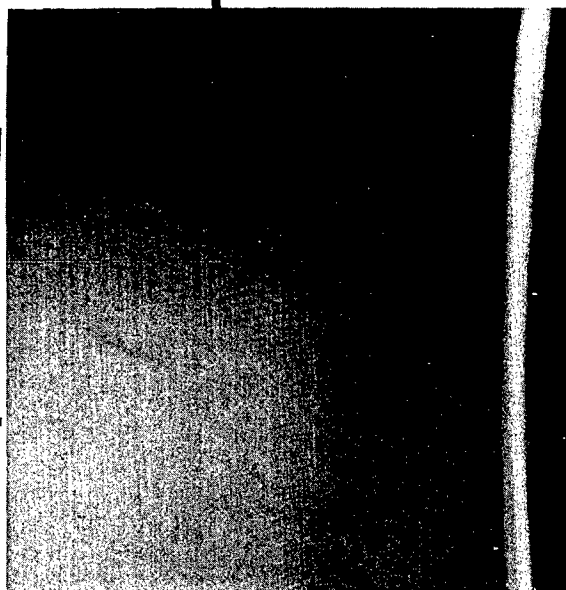
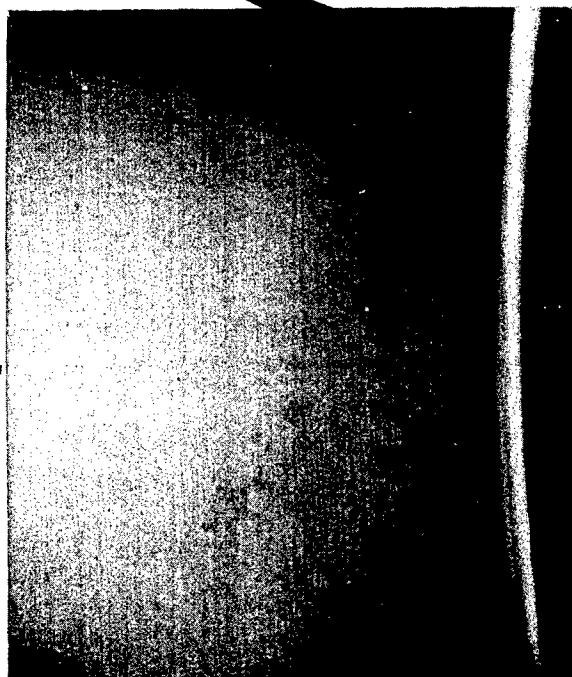
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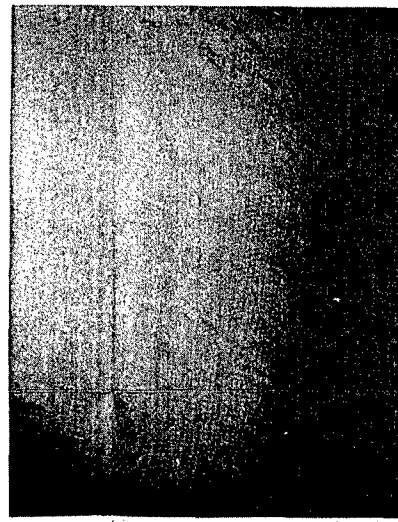


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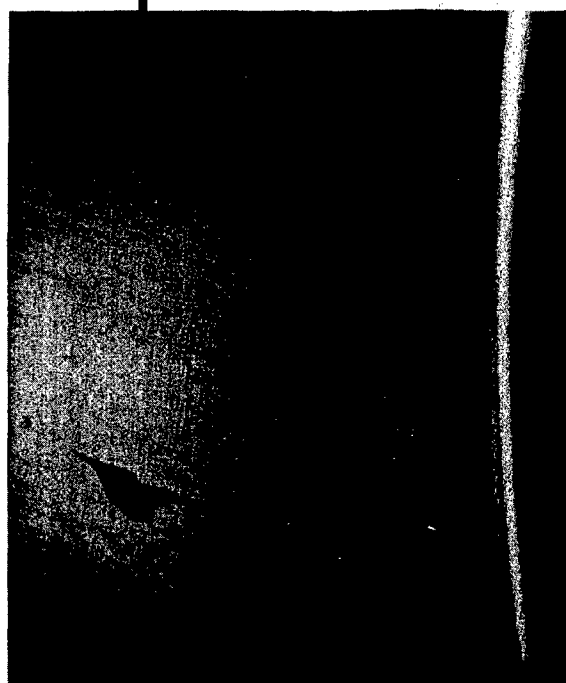
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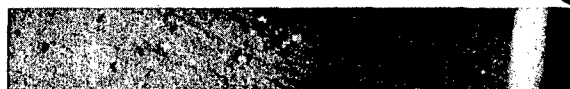
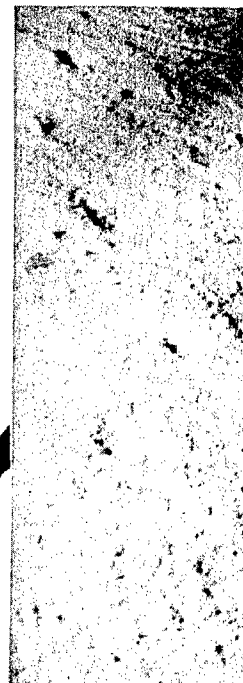
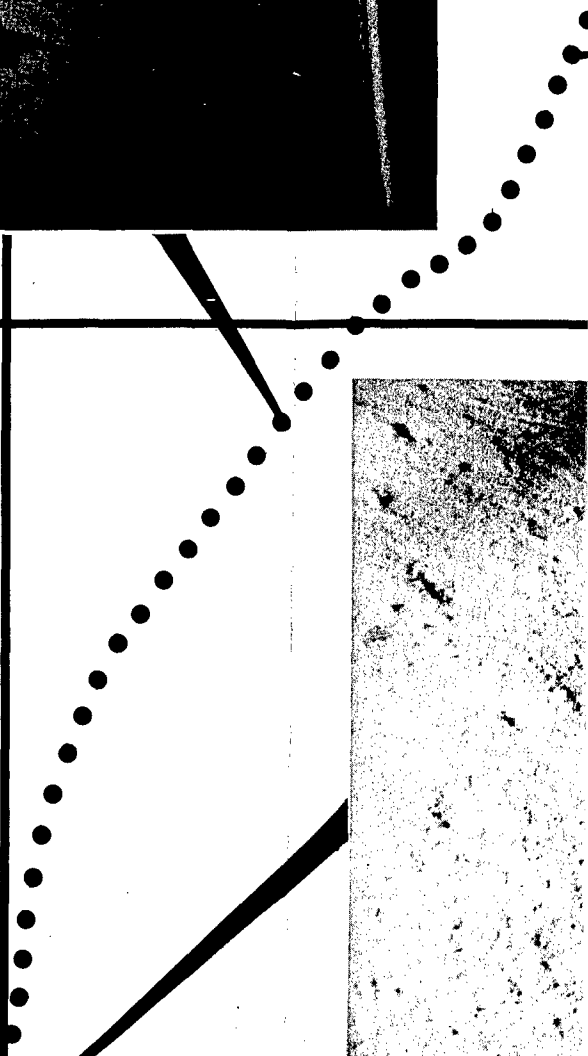
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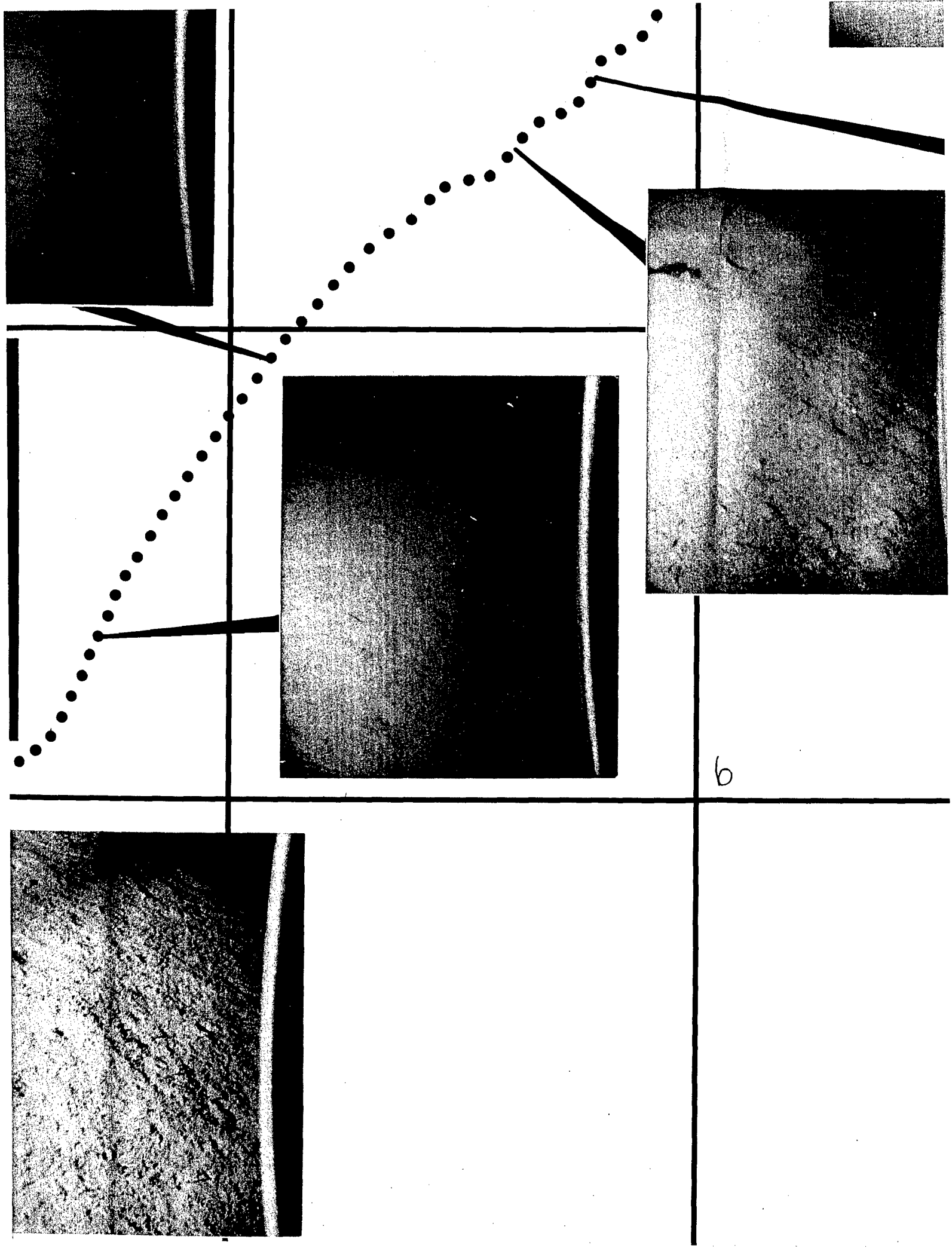


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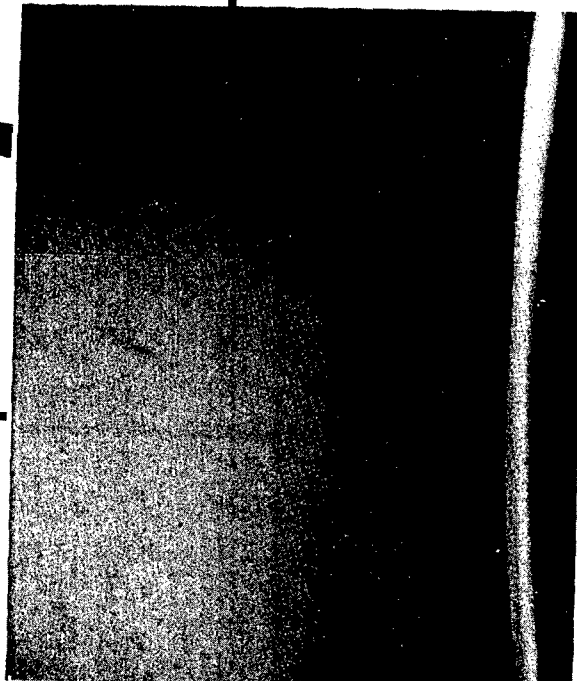
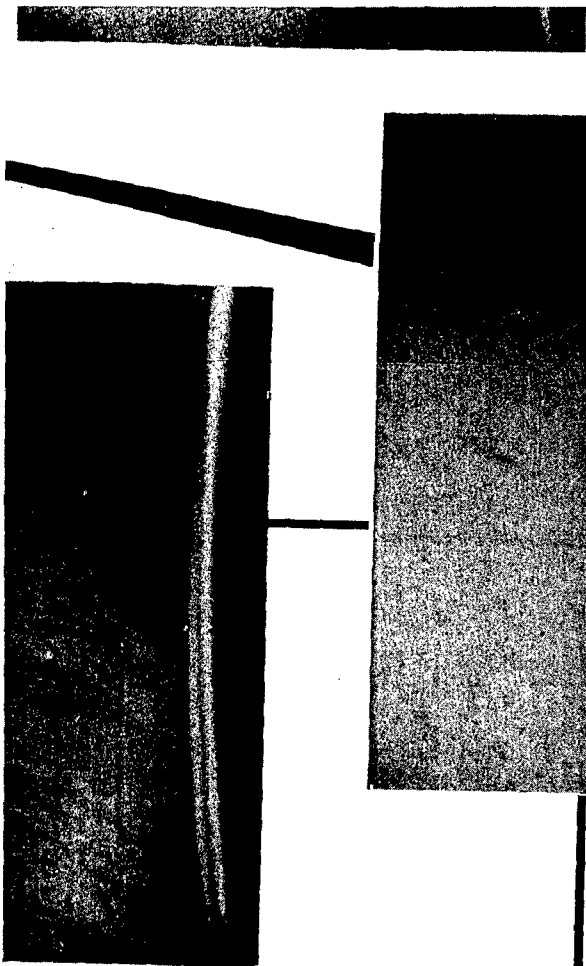


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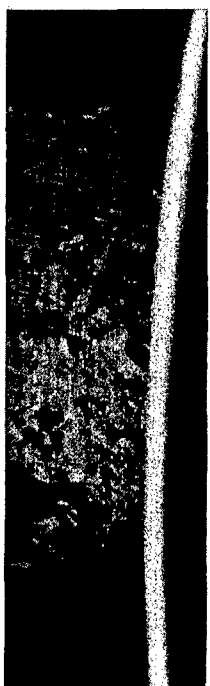
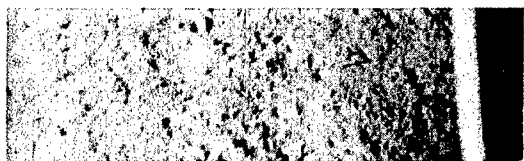
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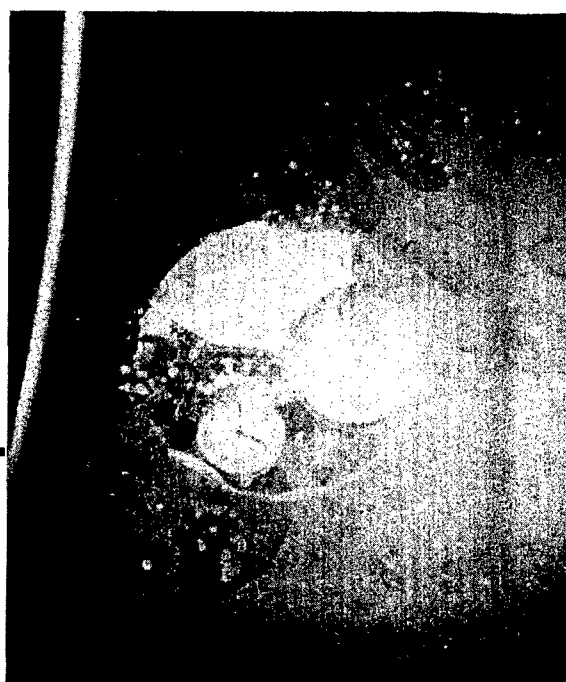


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FIGURE 26 SEA LAB III SEA FLOOR QL



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